



Travis AFB

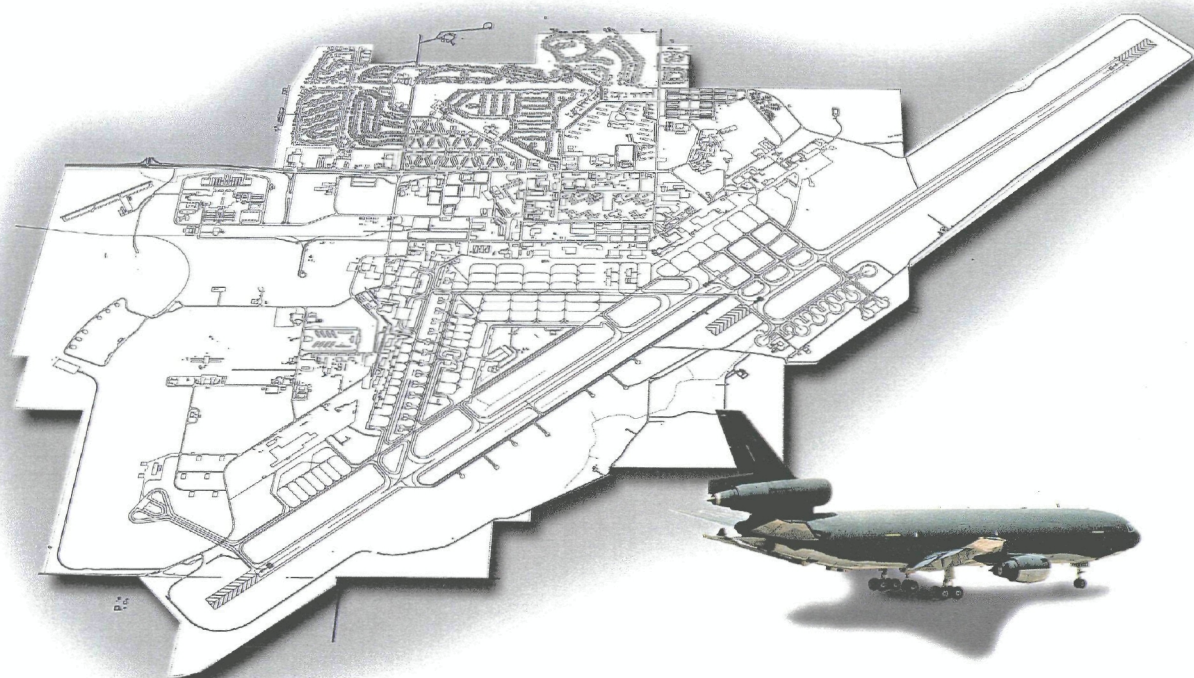


Environmental Restoration Program

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision

FINAL

MAY 2006





DEPARTMENT OF THE AIR FORCE
60TH CIVIL ENGINEER SQUADRON (AMC)

May 10, 2006

MEMORANDUM FOR DISTRIBUTION

FROM: 60 CES/CEVR
411 Airmen Drive
Travis AFB CA 94535-2001

SUBJECT: Final North, East, and West Industrial Operable Unit (NEWIOU) Soil, Sediment,
and Surface Water Record of Decision (ROD)

The attached change-out package contains the signature pages and other materials needed to convert the Draft Final Soil, Sediment, and Surface Water ROD for the North East West Industrial Operable Unit (NEWIOU) at Travis AFB into a final version. This ROD documents the selected alternatives for the remediation of NEWIOU soil, sediment, and surface water sites. If you have any questions concerning the attached materials, please contact Mr. Glenn Anderson at (707) 424-4359.

A handwritten signature in black ink, appearing to read "Mark H. Smith", is positioned above the printed name.

MARK H. SMITH
Chief, Environmental Restoration

Attachment:
Change-out package for the final NEWIOU Soil, Sediment, and Surface Water ROD

Distribution: (see attached)

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**North/East/West Industrial Operable Unit
Travis Air Force Base**

**North/East/West Industrial Operable Unit
Soil, Sediment, and Surface Water
Record of Decision**

Final

**60th Air Mobility Wing
Travis Air Force Base, California**

May 2006

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Acronyms

AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFI	Air Force Instruction
AMC	Air Mobility Command
AMW	Air Mobility Wing
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
AVGAS	aviation gasoline
BAAQMD	Bay Area Air Quality Management District
BASH	bird/air strike hazard
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
Cal-EPA	California Environmental Protection Agency
CAMU	Corrective Action Management Unit
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
COC	contaminant of concern
COEC	contaminant of ecological concern
COPC	contaminant of potential concern
COPEC	contaminant of potential ecological concern
CRP	Community Relations Plan
CSM	conceptual site model
CTV	critical toxicity value
CWA	Clean Water Act
CWC	California Water Code
DAA	Detailed Analysis of Alternatives
DCA	dichloroethane
DCE	dichloroethene
DDE	dichlorodiphenyldichloroethene
DI WET	deionized water waste extraction test
DNAPL	dense nonaqueous phase liquid
DPDO	Defense Property Disposal Office
DTSC	Department of Toxic Substances Control
EIAP	Environmental Impact Analysis Process
EIOU	East Industrial Operable Unit
EPC	exposure point concentration
ERA	ecological risk assessment

Acronyms (Cont'd)

ERP	Environmental Restoration Program
ESL	environmental screening level
ET	evapotranspiration
FFA	Federal Facility Agreement
FS	feasibility study
FTA	fire training area
gpm	gallon per minute
GSAP	groundwater sampling and analysis plan
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
HWCL	Hazardous Waste Control Law
IC	institutional controls
IR	Information Repository
IROD	Interim Record of Decision
ISA	Initial Screening of Alternatives
JEG	Jacobs Engineering Group, Inc.
JFSA	Jet Fuel Spill Area
K-12	kindergarten through 12th grade
LDR	land disposal restrictions
LECR	lifetime excess cancer risk
LUC	land use control
LUFT	leaking underground fuel tank
MADEP	Massachusetts Department of Environmental Protection
MAP	Management Action Plan
MCL	maximum contaminant level
mg/dL	milligrams per deciliter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MILCON	military construction
MNA	monitored natural attenuation
msl	mean sea level
MTR	minimum technology requirements
MW	monitoring well
NCP	National Contingency Plan

Acronyms (Cont'd)

NEPA	National Environmental Policy Act
NEWIOU	North/East/West Industrial Operable Unit
NFA	no further action
NOAA	National Oceanic and Atmospheric Association
NOU	North Operable Unit
NPL	National Priorities List
NWP	Nationwide Permit Conditions
OPS	Oxidation Pond Site
OSA	Oil Spill Area
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
OWS	oil/water separator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PCWQCA	Porter-Cologne Water Quality Control Act
POCOS	Petroleum-Only Contaminated Sites
POL	petroleum, oil, and lubricants
ppm	parts per million
PRG	preliminary remediation goal
RA	remedial action
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RD/RA	remedial design/remedial action
RI	remedial investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SDS	sludge disposal site
SDWA	Safe Drinking Water Act
SQT	Screening Quick Reference Tables
SSA	Solvent Spill Area
SS II	Storm Sewer II
SSRW	Storm Sewer Right-of-Way
SSS	Storm Sewer System
SSSW	soil, sediment, and surface water
SVE	soil vapor extraction
SVOC	semivolatile organic compound

Acronyms (Cont'd)

TBC	to be considered
TCDD(eq)	tetrachlorodibenzo-p-dioxin equivalent
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TPH-E	total petroleum hydrocarbons, extractable factor
TPH-P	total petroleum hydrocarbons, purgeable fraction
TQ	toxicity quotient
TSCA	Toxic Substances Control Act
URS	URS Group, Inc.
USC	United States Code
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
WABOU	West/Annexes/Basewide Operable Unit
WIOU	West Industrial Operable Unit
WTTP	West Treatment and Transfer Plant
°F	degrees Fahrenheit
µg/L	microgram per liter

Declaration

Site Name and Location

Department of the Air Force
Travis Air Force Base
Fairfield, California 94535-5000

Statement of Basis and Purpose

This Record of Decision (ROD) presents the soil, sediment, and surface water (SSSW) remedial actions for the North/East/West Industrial Operable Unit (NEWIOU) at the Travis Air Force Base (AFB or Base) Superfund Site (EPA ID#CA5570024575) in Solano County, California. The Air Force and the United States Environmental Protection Agency (U.S. EPA) co-selected the soil, sediment, and surface water remedial actions in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 United States Code (USC) §9601 *et seq.*, and with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 Code of Federal Regulations (CFR) Part 300 (National Contingency Plan [NCP]), and Travis AFB's Federal Facility Agreement (FFA) with the U.S. EPA, the California Department of Health Services, and the Regional Water Quality Control Board (RWQCB). The Administrative Record contains the documents used in the selection of the soil, sediment, and surface water remedial actions. The Administrative Record is available for review at Travis AFB.

The State of California, through the California Environmental Protection Agency's Department of Toxic Substances Control (Cal-EPA/DTSC) and the San Francisco Bay RWQCB, concurs with the selected soil, sediment, and surface water remedies.

Assessment of the Site

As a result of past industrial activities, releases of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), fuels (petroleum hydrocarbons), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxins, pesticides, and metals (inorganic compounds) have contaminated the soil at 18 NEWIOU sites and the sediment and surface water at 2 NEWIOU sites (Main and West Branches of Union Creek) at Travis AFB. Actual or threatened releases of hazardous substances from these sites, if not addressed by implementing the response actions selected in this NEWIOU SSSW ROD, may present a potential threat to soil, sediment, and surface water relative to public health, welfare, or the environment.

Fifty-nine sites with potential contamination resulting from past industrial activities were originally identified during the North Operable Unit (NOU) Remedial Investigation (RI), East Industrial Operable Unit (EIOU) RI, and West Industrial Operable Unit (WIOU) RI. Table I-1 presents the current status of the sites that were evaluated during the three RIs. After the RIs,

Table I-1

Listing and Summary of Current Status of Sites

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name	Site Designation	Status
Evaluated during the North Operable Unit Remedial Investigation		
Base Landfill No. 1	LF006	NFA for soil determined at conclusion of RI. Ground-water contamination is addressed in the NEWIOU Groundwater IROD.
Base Landfill No. 2	LF007	Remedy Selected in NEWIOU SSSW ROD
Former Skeet Range		NFA ^a
Cyanide Disposal Pit	OT011	NFA ^b
Former Defense Property Disposal Office (DPDO) Area	LF007	Remedy Selected in NEWIOU SSSW ROD
Evaluated during the East Industrial Operable Unit Remedial Investigation		
Oil Spill Area	SS016	Remedy Selected in NEWIOU SSSW ROD
Tower Area Removal Action	SS016	Remedy Selected in NEWIOU SSSW ROD
Facility 11	SS016	Remedy Selected in NEWIOU SSSW ROD
Facilities 13/14	SS016	Remedy Selected in NEWIOU SSSW ROD
Facility 20	SS016	Remedy Selected in NEWIOU SSSW ROD
Facilities 42/1941	SS016	Remedy Selected in NEWIOU SSSW ROD
Facilities 139/144	SS016	Remedy Selected in NEWIOU SSSW ROD
Solvent Spill Area, Facilities 550/552	SS015	Remedy Selected in NEWIOU SSSW ROD
Facility 808	SS015	Remedy Selected in NEWIOU SSSW ROD
Facility 1832	SS015	Remedy Selected in NEWIOU SSSW ROD
MW107x32 and MW246x32	ST032	Remedy Selected in NEWIOU SSSW ROD
MW329x29 Area	SS029	Remedy Selected in NEWIOU SSSW ROD
MW269x30 Area	SS030	Remedy Selected in NEWIOU SSSW ROD
Fire Training Area 4	FT005	Remedy Selected in NEWIOU SSSW ROD
Oxidation Pond Site	WP017	Remedy Selected in NEWIOU SSSW ROD
Sludge Disposal Site	OT010	Remedy Selected in NEWIOU SSSW ROD
Facility 1205	SD031	NFA for soil determined at conclusion of RI. Ground-water contamination is addressed in the NEWIOU Groundwater IROD.
Fire Training Area 2	FT003	Remedy Selected in NEWIOU SSSW ROD
Fire Training Area 3	FT004	Remedy Selected in NEWIOU SSSW ROD
Fire Training Area 1	FT002	Remedy Selected in NEWIOU SSSW ROD
Storm Sewer Right-of-Way (includes Main Branch of Union Creek)	SD001	Remedy Selected in NEWIOU SSSW ROD
North/South Gas Stations	ST018	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
Facility 363 (Fuel storage area)	ST028	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.

Table I-1 (Cont'd)

Listing and Summary of Current Status of Sites

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name	Site Designation	Status
Evaluated during the East Industrial Operable Unit Remedial Investigation		
Grid 216 I (Location of 1956 C-124 airplane crash)		NFA determined at conclusion of RI.
Facility 336 (Location of former pesticide shop)		NFA determined at conclusion of RI.
Facility 1185 (Location of possible fuel spill and UST)		NFA determined at conclusion of RI.
Facility 1201 (Flight kitchen and service shop)		NFA determined at conclusion of RI.
Facility 206 (Two USTs removed from site in 1984)		NFA determined at conclusion of RI.
Facility 226 (Auto and photography hobby shop)		NFA determined at conclusion of RI.
Facility 381 (Old Base Hospital)		NFA determined at conclusion of RI.
Evaluated during the West Industrial Operable Unit Remedial Investigation		
Facility 809	SS014	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
Facility 835		NFA determined at conclusion of RI.
Facility 839		NFA determined at conclusion of RI.
Facility 842		NFA determined at conclusion of RI.
Facility 871		NFA determined at conclusion of RI.
Abandoned AVGAS Pipeline	SS014	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
TF-33 Test Stand Area	ST027	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
JFSA – Site 1	SS014	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
JFSA – Site 2	SS014	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
JFSA – Site 3	SS014	Removed from CERCLA. Incorporated into the Travis AFB POCOS program.
Facilities 818 and 819	SS035	Remedy Selected in NEWIOU SSSW ROD.
Facility 811	SD034	Remedy Selected in NEWIOU SSSW ROD.
Facilities 872, 873, and 876	SD036	Remedy Selected in NEWIOU SSSW ROD.
Storm Sewer System B (includes West Branch of Union Creek)	SD033	Remedy Selected in NEWIOU SSSW ROD.
Facility 810	SD033	Remedy Selected in NEWIOU SSSW ROD.
Facility 1917	SD033	Remedy Selected in NEWIOU SSSW ROD.
South Gate Area	SD033	Remedy Selected in NEWIOU SSSW ROD.
Sanitary Sewer System	SD037	Remedy Selected in NEWIOU SSSW ROD.
Facilities 837 and 838	SD037	Remedy Selected in NEWIOU SSSW ROD.
Facility 919	SD037	Remedy Selected in NEWIOU SSSW ROD.

Table I-1 (Cont'd)

Listing and Summary of Current Status of Sites

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name	Site Designation	Status
Evaluated during the West Industrial Operable Unit Remedial Investigation (Cont'd)		
Ragsdale/V Area	SD037	Remedy Selected in NEWIOU SSSW ROD.
Facility 977	SD037	Remedy Selected in NEWIOU SSSW ROD.
Facility 981	SD037	Remedy Selected in NEWIOU SSSW ROD.
Area G Ramp	SD037	Remedy Selected in NEWIOU SSSW ROD.
^a NFA determined at conclusion of RI as an individual AOC. Several AOCs were combined and designated LF007 after the RI. See additional discussion in Section 3.4. ^b NFA for OT011 was determined and documented in the NFA consensus statement of 24 April 1996 (Travis AFB, 1996) which was signed by the U.S. Air Force, U.S. EPA, California Department of Toxic Substances Control, and San Francisco Regional Water Quality Control Board.		
AOC = area of concern	POCOS = Petroleum-Only Contaminated Site	
AVGAS = aviation gasoline	RI = remedial investigation	
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act	ROD = record of decision	
IROD = interim record of decision	SSSW = soil, sediment, and surface water	
JFSA = jet fuel spill area	U.S. EPA = United States Environmental Protection Agency	
NEWIOU = North/East/West Industrial Operable Unit	UST = underground storage tank	
NFA = no further action		

these three operable units (OUs) were merged into the NEWIOU for purposes of the Feasibility Study (FS), Proposed Plan, and ROD. Additional information on sites selected for No Further Action (NFA) at the conclusion of the RIs is provided in Section 3.4 of Part II (Decision Summary) of this ROD. At the NFA sites, residual levels of contaminants do not present a threat to human health or the environment. The Air Force, with regulatory concurrence, has determined that no further action is necessary and that the sites are suitable for unlimited use and unrestricted exposure.

The RIs identified the need for the evaluation of remedial alternatives at 16 soil sites and 2 soil, sediment, and surface water sites (18 total sites). All but five of these 18 sites (SD001, FT002, FT003, OT010, and WP017) require an action to address groundwater contamination and are included in the *Groundwater Interim Record of Decision for the North/East/West Industrial Operable Unit, Travis AFB, California* (Travis AFB, 1997) (NEWIOU Groundwater IROD). Two additional sites (LF006 and SD031) did not require evaluation for soil but require an action to address groundwater contamination and are included in the NEWIOU Groundwater IROD.

The NEWIOU contains most of the soil and groundwater sites on Travis AFB. The remaining sites on the Base are in the West/Annexes/Basewide Operable Unit (WABOU), except for sites removed from the WABOU, as discussed in the Declaration section of the *West/Annexes/Basewide Operable Unit Soil Record of Decision, Travis Air Force Base, California* (Travis AFB, 2002a) (WABOU Soil ROD). The WABOU Soil ROD was completed in December 2002 and served as a guide for the development of this NEWIOU SSSW ROD. Section 2.3 (Operable Units) of this NEWIOU SSSW ROD provides a more detailed description of the OUs on Travis AFB. The Travis AFB Basewide Groundwater ROD will document the final selection of remedies for all groundwater sites on Travis AFB.

Description of the Selected Remedies

The Air Force evaluated six potential remedial alternatives to address contaminated surface water in the NEWIOU and seven potential remedial alternatives to address contaminated soil and sediment in the NEWIOU. Table I-2 presents all remedial alternatives evaluated.

Table I-2

Evaluated Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Cleanup Alternative^a	Description
Surface Water Remedial Alternatives^a	
10. No Action	Federal regulations require the use of this alternative as a starting point for comparing the other alternatives. No surface water treatment takes place.
11. Institutional Actions	Surface water would be monitored to determine the levels of contamination over time. No active treatment of the water is involved. The <i>Travis AFB General Plan (Base General Plan)</i> (Travis AFB, 2002b) will be updated after the ROD is signed to note that the surface water is being monitored and not for use.
12. Collection Sump, Ion Exchange, Activated Carbon, Discharge to Union Creek	Water is pumped into a collection sump, where it is held and treated. Two forms of treatment are used. First, ion exchange uses special resins to remove metals from the water. Second, the water, still contaminated with organic contaminants, is then passed through charcoal filters. The contaminants adsorb onto the charcoal, which can later be regenerated to remove the contaminants. Treated water is discharged (in accordance with effluent discharge limits) to Union Creek, which empties into the Suisun Marsh via the Hill Slough.
13. Collection Sump, Activated Carbon, Discharge to Union Creek	Same as Alternative 12, without ion exchange. This alternative would be used at sites without metal contamination.
14. Slip-Lining and Collaring Storm Sewer	During slip-lining, a plastic pipe is installed within an existing deteriorated storm sewer pipe, thereby limiting infiltration of contaminated groundwater into the storm sewer system. Collars are external barriers installed along the pipe to prevent contaminated water from moving through the gravel surrounding the pipe.
15. Source Control	Source control relies on treating contamination at the source, before it is discharged into a creek. Pump and treat interim actions to address contaminated groundwater will prevent possible contaminant movement to surface water. Periodic cleanout of storm sewers and sumps also will prevent contaminants from reaching the creek.
Soil and Sediment Remedial Alternatives^a	
16. No Action	Federal regulations require the use of this alternative as a starting point for comparing the other alternatives. Under this alternative, no soil or sediment treatment takes place.
17. Land Use Controls	Future land use and soil and sediment disturbance activities are restricted. The Base General Plan will be updated after the ROD is signed to reflect any specific restrictions required at each site.
18. Excavation	Contaminated soils are excavated and removed to a designated CAMU at Travis AFB or to an off-base landfill.

Table I-2 (Cont'd)

Evaluated Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Cleanup Alternative	Description
Soil and Sediment Remedial Alternatives (cont'd)	
19. Cap	The site is covered with a material such as asphalt, concrete, synthetic membrane, or soil and /or clay. For landfill areas, the area also is graded to control runoff, thereby minimizing the potential for rainwater to move through contaminated soil, to protect the groundwater below from contamination.
20. Excavation, Ex Situ High Temperature Thermal Treatment, Disposal at Landfill	Contaminated soil is excavated and treated at high temperatures (for example, in a rotary kiln incinerator). As a result, organic contaminants are destroyed through conversion to carbon dioxide, water, and hydrochloric acid. The acid is then removed. Treated soil is placed at the designated CAMU or at an off-base landfill.
21. In Situ Soil Vapor Extraction (SVE), Off-Gas Treatment	Contaminated soil vapor is extracted from the ground to remove contaminants. The contaminated vapors are then treated by catalytic or thermal oxidation, which converts VOCs to carbon dioxide, water, and hydrochloric acid. The acid is then removed.
22. In Situ Bioventing	Air is injected below the ground surface to encourage the growth of microorganisms in the soil. Microorganisms can help break down certain VOCs.
^a Surface water alternatives are numbered 10 through 15, and soil and sediment alternatives are numbered 16 through 22 to be consistent with the numbers used in the NEWIOU Feasibility Study (Radian Corporation, 1996a). Groundwater alternatives were numbered 1 through 9.	
CAMU = Corrective Action Management Unit	SVE = soil vapor extraction
NEWIOU = North/East/West Industrial Operable Unit	VOC = volatile organic compound
ROD = record of decision	

Subsequent to the evaluation of alternatives, the Air Force selected a remedy for the 18 NEWIOU sites addressed in this NEWIOU SSSW ROD. Table I-3 presents the selected remedies. The Air Force and the U.S. EPA co-selected these remedies as the most appropriate strategies for addressing contaminated soil, sediment, and surface water in the NEWIOU. These remedies address the potential human health and environmental risks that could result from exposure to human (e.g., workers and residents) and ecological (e.g., terrestrial and aquatic) receptors, or the migration of contaminants to groundwater or surface water.

Table I-3

Selected Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Description	Site Designation	Medium	Selected Alternative
Storm Sewer Right-of-Way (includes Main Branch of Union Creek)	SD001	Soil	16 – No Action
		Sediment	18 – Excavation ^a
			17 – Land Use Controls ^b
		Surface Water	10 – No Action ^c
Fire Training Area 1	FT002	Soil	16 – No Action
Fire Training Area 2	FT003	Soil	18 – Excavation
			17 – Land Use Controls ^b
Fire Training Area 3	FT004	Soil	18 – Excavation
			17 – Land Use Controls ^b

Table I-3 (Cont'd)

Selected Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Description	Site Designation	Medium	Selected Alternative
Fire Training Area 4	FT005	Soil	18 – Excavation 17 – Land Use Controls ^b
Base Landfill No. 2	LF007	Soil	18 – Excavation 17 – Land Use Controls ^b
Sludge Disposal Site	OT010	Soil	16 – No Action
Solvent Spill Area, Facilities 550/552, and 1832	SS015	Soil	17 – Land Use Controls. Cleanup has been completed as a removal action.
Oil Spill Area, Facilities 11, 13/14, 20, 42/1941, 139/144, and sections of Storm Sewer Right-of-Way	SS016	Soil	17 – Land Use Controls
Oxidation Pond Site	WP017	Soil	16 – No Action
MW-329 Area	SS029	Soil	16 – No Action
MW-269 Area	SS030	Soil	16 – No Action
MW-107, MW-246	ST032	Soil	17 – Land Use Controls
Storm Sewer System B (includes West Branch of Union Creek), Facility 810, Facility 1917, and South Gate Area	SD033	Soil	17 – Land Use Controls
		Sediment	18 – Excavation ^a 17 – Land Use Controls ^b
		Surface Water	10 – No Action ^c
Facility 811	SD034	Soil	16 – No Action
Facilities 818 and 819	SS035	Soil	16 – No Action
Facilities 872, 873, and 876	SD036	Soil	16 – No Action
Sanitary Sewer System, Facilities 837, 838, 919, 977, and 981, Area G Ramp, and Ragsdale/V Area	SD037	Soil	17 – Land Use Controls

^a Excavation for sediment at SD001 will be a total of 500 linear feet at sample point 0014 (250 upstream, 250 downstream). Excavation for sediment at SD033 will be in the area of sample point U17 (from Outfall II to the confluence of the West and Main Branches of Union Creek).

^b Land use controls will be required if the levels of hazardous substances remaining in the soil or sediment after excavation do not allow for unlimited use and unrestricted exposure. At LF007, land use controls will also be required to protect the integrity of the CAMU cover at that site.

^c The 1998 NEWIOU SSSW Proposed Plan proposed "Source Control" (extraction and treatment of groundwater) as the cleanup alternative for surface water at these sites, indicating Union Creek is not a source of contamination, but that the creek may be receiving TCE-contaminated water from groundwater through storm sewer infiltration. Subsequent to the 1998 NEWIOU SSSW Proposed Plan, extraction and treatment (pump and treat) of contaminated groundwater was implemented as part of the WABOU and NEWIOU Groundwater IRODs. GSAP sampling has shown that extraction of groundwater has reduced the levels of TCE in the creek to levels that do not pose a risk to human health or the environment. GSAP monitoring will continue to be used to ensure that groundwater actions are preventing contaminants from reaching Union Creek. As "Source Control" has already been implemented under the groundwater IRODs, no action will be implemented under this ROD for surface water.

CAMU = Corrective Action Management Unit
 GSAP = groundwater sampling and analysis plan
 IROD = interim record of decision
 NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision
 SSSW = soil, sediment, and surface water
 TCE = trichloroethene
 WABOU = West/Annexes/Basewide Operable Unit

In July 2003, the Air Force completed the SS015 removal action. The removal action met the industrial cleanup levels of the selected remedial action, and the residual contamination in the removal area was less than the residential preliminary remediation goals (PRGs). However, during a subsequent construction project, a different area of SS015 was found to have soil contamination that was less than the industrial PRG but more than the residential PRG. Even though this area is under a concrete parking lot, Alternative 17 (Land Use Controls) will be applied to this site.

Community Acceptance of Selected Remedies

The Air Force issued the *North/East/West Industrial Operable Unit, Travis Air Force Base, Proposed Plan for Soil, Sediment, and Surface Water* (Travis AFB, 1998a) (NEWIOU SSSW Proposed Plan) and held a public comment period in 1998 to promote public input on the Air Force approach to soil remediation. The Proposed Plan described several potential alternatives for each site, and excavation was identified as the preferred alternative for any site where excavation could likely end up as the selected remedial action for the site. As a result, 16 of the 18 sites had excavation as all or part of the proposed remedy.

Subsequently, after detailed site-by-site presentations and discussions with regulatory agencies, additional sampling at some of the sites, evaluation of human health risks by comparison to U.S. EPA PRGs, and an updated ecological risk assessment (ERA), it appeared that at many of the sites, excavation was not necessary. Specifically, it was determined that for sites FT002, OT010, SS015, SS016, WP017, SS029, SS030, ST032, SS035, and SD037, which previously had excavation as the preferred alternative in the Proposed Plan, the preferred alternative should be no action or land use controls, as shown in Table I-3. For two sites, SD034 and SD036, which had land use controls or natural attenuation as the preferred alternative in the NEWIOU SSSW Proposed Plan, it was subsequently determined that the preferred alternative should be no action. These new preferred alternatives had all been identified as alternative remedies for each site in the Proposed Plan.

To inform the public of these proposed changes and to solicit public input on the new preferred alternatives, in 2006 the Air Force provided a new fact sheet, supplemental handout, public notice, public comment period, and public meeting on 26 January 2006. The new fact sheet and supplemental handout contained revisions to the NEWIOU SSSW Proposed Plan. These actions provided the public the opportunity to comment on the revised proposed alternatives.

The selected remedies in this ROD are the same as the preferred alternatives identified in the 2006 fact sheet, the 2006 supplemental handout, and at the public meeting, except that the name of the selected remedy for surface water at SD001 and SD033 is changed from "Source Control" to "No Action." As explained in Section 5.8, Section 5.1.1, and footnote c to Tables I-3 and II-5-15, this is a change in the name of the remedy only and not a change in the actual actions to be taken for surface water under this ROD. More specific information on this effort and the public response to both public comment periods is provided in Part III (Responsiveness Summary) of this ROD. Additional information on Community Participation in the Travis AFB Environmental Restoration Program (ERP) is provided in Section 2.6 of Part II of this ROD.

On-Base Consolidation

Alternative 18 (Excavation) is the selected remedial alternative for six of the NEWIOU soil and sediment sites (SD001, FT003, FT004, FT005, LF007, and SD033). Alternative 18 is described in the NEWIOU SSSW Proposed Plan as excavation of contaminated soil and sediment and removal to a designated Corrective Action Management Unit (CAMU) at Travis AFB or to an off-base landfill. Since the NEWIOU SSSW Proposed Plan was issued, the Air Force has built a CAMU within the boundaries of LF007, which was a base landfill that was closed and capped with native soil in 1974. Maintenance of the existing landfill consisted of the addition of soil and grading of the cap to allow good surface drainage. The regraded cap provided the foundation for the CAMU. The WABOU Soil ROD (Travis AFB, 2002a) provided the authority to build the CAMU. In 2003, excavated soil from three WABOU sites and the SS015 soil removal action were consolidated in the CAMU and capped with an evapotranspiration (ET) cap. Additional phase(s) of CAMU construction will be used to add and cap excavated soil and sediment from NEWIOU sites, as specified in this ROD.

The Air Force and regulatory agencies have established CAMU soil acceptance levels to determine the contaminant types and soil concentrations that can be placed in the CAMU. These requirements are presented in Table II-5-2 (CAMU Soil Acceptance Levels). If the contaminant levels within excavated soil and/or sediment exceed CAMU acceptance requirements, the Air Force will dispose of the soil at an appropriate permitted off-base landfill. If off-base disposal is necessary, the appropriate off-base disposal facility will be determined in accordance with the off-site rule of 40 CFR Section 300.440. Based on the most recent soil data, most, if not all, of the soil excavated from NEWIOU sites should meet CAMU soil acceptance levels and be suitable for placement in the CAMU.

Remedial Design/Remedial Action Documents

The Air Force will implement soil remedial actions as described in this NEWIOU SSSW ROD. Several primary documents under the Travis AFB FFA support the implementation of these actions. The Air Force has prepared the final *Basewide Soil Remedial Design/Remedial Action (RD/RA) Plan, Travis AFB, California* (Soil RD/RA Plan) (URS Group, Inc. [URS], 2002), which covers the general approach to implementing the soil remedies at all Travis AFB soil sites. The RD/RA Plan includes a description of primary documents that require regulatory approval under the Travis AFB FFA. The Air Force also has prepared three CAMU documents. The *LF007 Soil Remedial Action Design Report and Post-Closure Maintenance Plan* (CH2M HILL, 2002) addresses the CAMU design and maintenance. The *LF007 Soil Remedial Action Phase I Landfill Cap, CAMU Subgrade, Wetland Mitigation Report* (Shaw E&I, 2003) summarizes the construction of Phase 1 of the CAMU, which involved performing maintenance on the existing landfill cap, preparing the foundation for the CAMU, and constructing new wetlands to mitigate for wetlands required to be filled in for cap maintenance. The *LF007 Phase 2 Soil Remedial Action Report* (Shaw E&I, 2004) summarizes the construction of Phase 2 of the CAMU, which consolidated and capped soil from four ERP sites.

In addition, the Air Force will prepare site-specific remedial designs and remedial action work plans for each NEWIOU site to provide a detailed approach for the selected remedy at the appropriate site. The regulatory agencies will review each of these documents, as they are

primary documents under the Travis FFA. The Air Force and regulatory agencies will also review the analytical and performance data from these actions to verify their effectiveness at meeting remedial action objectives (RAOs).

Soil, Sediment, and Surface Water Cleanup Levels

The cleanup levels presented in Section 5.3 are based on the protection of human health, ecological receptors, and groundwater and surface water beneficial uses.

Following lengthy negotiations with the regulatory agencies encompassing both the previously executed WABOU Soil ROD and this NEWIOU SSSW ROD, the Air Force accepted the U.S. EPA's recommendation to use the current PRGs (Smucker, 2004) as a basis for soil cleanup levels for carcinogenic chemicals that equate to a fixed level of risk (1×10^{-6}) and for non-carcinogenic chemicals that equate to a fixed level of risk (hazard index [HI] = 1). PRGs are "To Be Considereds" (TBCs), not federal and state applicable or relevant and appropriate requirements (ARARs). TBCs include nonpromulgated criteria, advisories, guidance, and proposed standards issued by federal or state governments. By definition, ARARs are promulgated, or legally enforceable federal and state requirements. TBCs are not ARARs because they are not promulgated requirements. The Air Force accepted human health cleanup levels based on PRGs for NEWIOU soil and sediment sites because most sites have multiple contaminants and a cumulative risk that needs to be addressed. While using these PRGs potentially results in cleanup levels more conservative than required, Travis AFB determined that its site-specific situations with multiple contaminants justified accepting the PRG-based cleanup levels. Travis AFB estimated the expense of justifying less conservative cleanup levels to the regulators in terms of time and money and ultimately determined that accepting the PRG-based cleanup levels will result in minimal incremental cleanup costs. This approach has already worked well under the WABOU Soil ROD. Cleanup levels based on PRGs will be used unless there are site-specific considerations that justify a less stringent cleanup level. In this ROD, there are no sites where a less stringent cleanup level was used. Surface water cleanup levels were not developed because Alternative 10 (No Action) is the selected alternative for surface water under this ROD. Groundwater Sampling and Analysis Program (GSAP) sampling has shown that extraction of groundwater has reduced the levels of TCE in the creek to levels that do not pose a risk to human health or the environment.

The October 2004 U.S. EPA Region 9 PRG table contains concentrations for both residential and industrial use. Since Travis AFB is an industrial facility, as described in Section 5.2.1 (Residential/Industrial Exposure Scenarios), the soil cleanup levels for each site are based on the industrial PRG. The soil cleanup level table for each site (included in Section 5.3 of this report) contains two columns of the current residential PRGs (carcinogen and non-carcinogen) and two columns of the current industrial PRGs (carcinogen and non-carcinogen) that equate to a potential 10^{-6} cancer risk and potential HI of 1.

Section 5.2.4 discusses how a NEWIOU ERA was performed to derive inputs for soil, sediment, and surface water actions and cleanup levels that are protective of ecological receptors.

Section 5.2.5 discusses the rationale for determining whether soil remedial actions will be protective of groundwater beneficial uses.

Land Use Controls

Alternative 17 (Land Use Controls) is all or part of the selected remedial alternative for 10 NEWIOU soil, sediment, and surface water sites. The Air Force identifies herein the land use controls (LUCs) applicable to the NEWIOU sites that the Air Force deems necessary for future protection of human health and the environment. Alternative 17 is accomplished by a prohibition on residential development and restrictions on soil and sediment disturbance in designated areas set forth in the Travis AFB General Plan (Base General Plan), administrative measures, and signage. For the CAMU cover at LF007, Alternative 17 prohibits all activities on the cover other than CAMU operations and maintenance activities as described in the *LF007 Soil Remedial Action Design Report and Post-Closure Maintenance Plan* (CH2M HILL, 2002). The restrictions on activities on the CAMU cover will also be set forth in the Base General Plan. The Air Force will include in the Base General Plan any specific restrictions required at each site, a statement that restrictions are required because of the presence of pollutants or contaminants, the current land users and uses of the site, the geographic control boundaries, and the objectives of the land use controls. Unless a site is cleaned up to levels appropriate for unlimited use and unrestricted exposure, the Base General Plan will reflect the prohibitions on residential development (including day care centers, kindergarten through 12th grade (K-12) schools, play areas, and hospitals), restrictions on soil and sediment disturbances, and restrictions on all activities on the CAMU cover at LF007 other than operations and maintenance activities. Upon completion of a remedial action at a site, the Base will update the Base General Plan to modify the site-specific use restrictions as appropriate. The Base General Plan will contain a map depicting the geographic boundaries of all NEWIOU sites where land use controls are in effect. The administrative measures are the Base Civil Engineer work request procedures, the base dig permit procedures, and the Environmental Impact Assessment Process (EIAP) as described in Section 5.4.1.

Section 5.4 provides a more detailed description of the remedial action objectives of Alternative 17, of administrative measures to be applied at sites with LUCs, of provisions regarding transfer of property subject to LUCs and regulatory notification of proposed land use changes and discovery of activities inconsistent with LUC objectives, and of provisions regarding monitoring. The Air Force is responsible for implementing, monitoring, maintaining, and enforcing the identified controls.

If the Air Force determines that it cannot meet specific LUC requirements, it is further understood that the remedy may be reconsidered and that additional measures may be required to ensure the protection of human health and the environment.

NEWIOU SSSW ROD Data Certification Checklist

The following information is included in Part II (Decision Summary) of this ROD. Additional information on these sites can be found in the Travis AFB Administrative Record.

1. Contaminants of concern (COCs) and contaminants of potential ecological concern (COPECs) and their respective concentrations identified in the RIs (Table II-3-2 [Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs]).

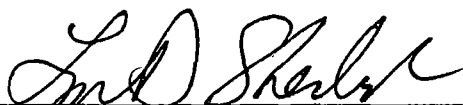
2. Baseline risk represented by the COCs identified in the RIs (Table II-3-2 [Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs]).
3. Cleanup levels established for COCs and/or contaminants of ecological concern (COECs) and the basis for these levels (Section 5.2 [Criteria Used to Determine Soil and Sediment Cleanup Levels] and Tables II-5-3, II-5-5, II-5-7, II-5-9, II-5-11, and II-5-13).
4. How source materials constituting principal threats are addressed (Section 5.3 [Site-Specific Remedial Actions]).
5. Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (Section 5.2.1 [Residential/Industrial Exposure Scenarios], Section 1.4.3 [Groundwater Use], and Section 5.2.5 [Groundwater Protection]).
6. Potential land use that will be available at the sites as a result of the selected remedies (Section 5.4.2 [Residential Cleanup Levels]).
7. Total present worth cost estimates (Section 4.3 [Comparative Analysis of Alternatives], Tables II-4-4 and II-4-7).
8. Key factor(s) that led to selecting the remedies (Section 5.3 [Site-Specific Remedial Actions]).

Declaration

These soil, sediment, and surface water remedial actions are protective of human health and the environment, are compliant with federal and state ARARs directly associated with these actions, and are cost-effective. These actions utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Remedies that treat contamination were considered. However, for the NEWIOU soil and sediment sites, excessive cost made treatment impractical when compared to excavation and disposal. Because these remedies will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the final remedial action to ensure that the remedies are, or will be, protective of human health and the environment. The Air Force and the regulatory agencies have addressed the statutory preference for remedies that reduce toxicity, mobility, or volume as a principle element in this NEWIOU SSSW ROD.

**Lead and Support Agency Acceptance of the
NEWIOU Soil, Sediment, and Surface Water Record of Decision
Travis Air Force Base, California**

This signature sheet documents the United States Air Force's and the United States Environmental Protection Agency's co-selection and documentation of the soil, sediment, and surface water remedial actions contained in this Record of Decision for the NEWIOU at Travis Air Force Base, and the State of California, by the California Environmental Protection Agency, Department of Toxic Substances Control's and the San Francisco Bay Regional Water Quality Control Board's concurrence with this Record of Decision. The respective parties may sign this sheet in counterparts.



Lyn D. Sherlock
Colonel, USAF
Commander
60th Air Mobility Wing

2 May 06

Date

Kathleen H. Johnson
Chief
Federal Facilities Cleanup Branch
U.S. Environmental Protection Agency, Region 9

Date

The State of California, Department of Toxic Substances Control (DTSC) had an opportunity to review and comment on this Record of Decision, and our concerns were addressed.

Anthony J. Landis, P.E.
California Environmental Protection Agency
Department of Toxic Substances Control
Chief of Operations
Office of Military Facilities

Date

Bruce H. Wolfe
California Regional Water Quality Control Board
San Francisco Bay Region
Executive Officer

Date

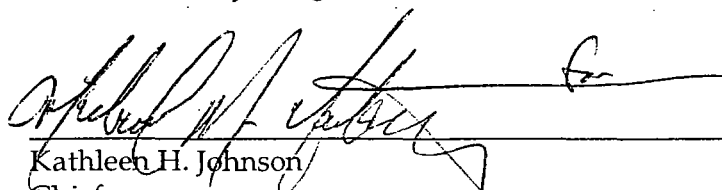
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Lead and Support Agency Acceptance of the
NEWIOU Soil, Sediment, and Surface Water Record of Decision
Travis Air Force Base, California

This signature sheet documents the United States Air Force's and the United States Environmental Protection Agency's co-selection and documentation of the soil, sediment, and surface water remedial actions contained in this Record of Decision for the NEWIOU at Travis Air Force Base, and the State of California, by the California Environmental Protection Agency, Department of Toxic Substances Control's and the San Francisco Bay Regional Water Quality Control Board's concurrence with this Record of Decision. The respective parties may sign this sheet in counterparts.

Lyn D. Sherlock
Colonel, USAF
Commander
60th Air Mobility Wing

Date



Kathleen H. Johnson
Chief
Federal Facilities Cleanup Branch
U.S. Environmental Protection Agency, Region 9

4/24/06
Date

The State of California, Department of Toxic Substances Control (DTSC) had an opportunity to review and comment on this Record of Decision, and our concerns were addressed.

Anthony J. Landis, P.E.
California Environmental Protection Agency
Department of Toxic Substances Control
Chief of Operations
Office of Military Facilities

Date

Bruce H. Wolfe
California Regional Water Quality Control Board
San Francisco Bay Region
Executive Officer

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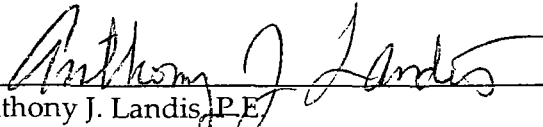
Lyn D. Sherlock
Colonel, USAF
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Chief
Federal Facilities Cleanup Branch
U.S. Environmental Protection Agency, Region 9

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Anthony J. Landis, P.E.
California Environmental Protection Agency
Department of Toxic Substances Control
Chief of Operations
Office of Military Facilities

4-18-06

Date

Bruce H. Wolfe
California Regional Water Quality Control Board
San Francisco Bay Region
Executive Officer

Date

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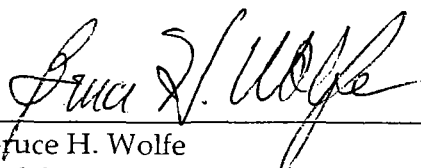
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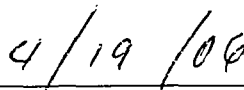
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Department of Toxic Substances Control
Chief of Operations
Office of Military Facilities

Date



Bruce H. Wolfe
California Regional Water Quality Control Board
San Francisco Bay Region
Executive Officer



Date

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Decision Summary

Introduction

This Decision Summary includes the findings, evaluations, decision-making process, and selected remedial actions for the North/East/West Industrial Operable Units (NEWIOU) Soil, Sediment, and Surface Water (SSSW) Record of Decision (ROD) also referred to as the NEWIOU SSSW ROD. This Decision Summary consists of the following sections.

- **Section 1.0**—Describes the physical and ecological setting, and current land use of Travis Air Force Base (AFB or Base).
- **Section 2.0**—Provides an overview of the Travis AFB Restoration Branch and environmental programs.
- **Section 3.0**—Summarizes the nature and extent of soil contamination as presented in the three remedial investigations (RIs) (*Remedial Investigation, North Operable Unit, Travis Air Force Base, California*, Radian Corporation [Radian], 1995 [NOU RI]; *Remedial Investigation Report, East Industrial Operable Unit, Travis AFB, California*, Weston, 1995a [EOU RI]; and *Remedial Investigation, West Industrial Operable Unit, Travis AFB, California*, Radian, 1996a) [WIOU RI].
- **Section 4.0**—Presents the remedial alternatives that were considered and the comparison of the alternatives to the criteria set forth in the National Contingency Plan (NCP) as presented in the *North/East/West Industrial Operable Unit Feasibility Study, Travis Air Force Base, California* (NEWIOU FS) (Radian, 1996b).
- **Section 5.0**—Identifies the selected remedial actions, the selected soil and sediment cleanup levels, and the rationale for their selection. Land use controls, statutory determinations, remedial design/remedial action (RD/RA) implementation and schedule, site closure, and documentation of significant changes are also discussed.
- **Section 6.0**—Presents the applicable or relevant and appropriate requirements (ARARs) and performance standards for the actions.
- **Section 7.0**—Presents the list of cited works.

Note that Sections 3.0 and 4.0 summarize the RIs and FS, respectively, from a historical perspective. As discussed in Section 2.2.3, after the NEWIOU SSSW Proposed Plan (Travis AFB, 1998a) was completed, there was a four-year delay while the WABOU Soil ROD (Travis AFB, 2002a) was completed. Thereafter, work began on the NEWIOU SSSW ROD using the approach that proved successful for the WABOU Soil ROD. One of the changes implemented in the NEWIOU SSSW ROD was to base cleanup levels on U.S. EPA Region 9's preliminary remediation goals (PRGs) unless there are site-specific considerations that justify a less stringent cleanup level. Although PRGs are "To Be Considereds" (TBCs), not federal and state ARARs, the use of PRGs as the basis for cleanup levels for human health is discussed in Section 5.2.3. In

addition, due to delay and the complexity of dealing with 18 sites, 40 contaminants of concern (COCs), 3 media (soil, sediment, and surface water), and 3 types of receptors (human, ecological, and groundwater) in one document, it was decided to use technical memoranda (tech memos) as ROD development documents. Three tech memos were prepared to aid in development of the ROD: The *Summary of Remedial Investigation Data and Risk Management Decisions for Human Health at NEWIOU Soil Sites, Travis Air Force Base, California* (referred to as the Human Health Tech Memo [URS, 2004a]); the *Ecological Technical Memorandum for the NEWIOU at Travis Air Force Base, California* (referred to as the Eco Tech Memo [URS, 2005]); and the *Groundwater Protection at NEWIOU Soil Sites Technical Memorandum, Travis Air Force Base, California* (referred to as the Groundwater Protection Tech Memo [URS, 2004b]). These tech memos provided site-by-site summaries and maps with RI data and any updated site information. The Eco Tech Memo provided an extensive update of the ecological risk assessment. After extensive discussion between the Air Force and the regulatory agencies, selected remedial alternatives were included in each tech memo for each site with supporting rationale. The information from the three tech memos was summarized and consolidated in this ROD. The intent was to have this ROD provide the decisions on remedial actions and how they were developed, yet still be concise (approximately 1 inch thick). The details of the ROD development are available in the tech memos (a total of approximately 5 inches thick) if needed. Sections 5.2.3, 5.2.4, and 5.2.5 discuss each of the tech memos in more detail.

The tech memos built upon the NOU, EIOU, and WIOU RIs, the NEWIOU FS, and the NEWIOU SSSW Proposed Plan, but at some sites, the remedial alternative selected in the ROD differed from the NEWIOU SSSW Proposed Plan. All remedial alternatives selected in this ROD were included and discussed in the NEWIOU SSSW Proposed Plan. The Responsiveness Summary (Part III) of this ROD documents the presentation of the differences between the NEWIOU SSSW Proposed Plan and this ROD to the public and their response.

1.0 Travis AFB Description

Travis AFB is located midway between San Francisco and Sacramento, California, about 3 miles east of downtown Fairfield in Solano County. The Base occupies over 6,383 acres. In addition, the Base maintains ownership of, or administrative control over, 11 annexes at off-base locations. Travis AFB's workforce consists of approximately 14,300 military members and civilian employees. Figure II-1-1 presents maps of the regional location of Travis AFB and its annexes.

Travis AFB is currently part of the Air Mobility Command (AMC) and is host to the 60th Air Mobility Wing (AMW). The AMW operates C-5 Galaxy cargo aircraft and KC-10 Extender refueling aircraft. The primary missions of Travis AFB since its establishment have been strategic reconnaissance and airlift of freight and troops.

1.1 Physical Description

Travis AFB has a gently sloping to nearly flat topography, with variations in topographic relief of up to 50 feet. Elevations at Travis AFB range from over 100 feet above mean sea level (msl) near the northern boundary to less than 20 feet above msl near the South Gate. The ground surface generally slopes to the south or southeast at about 30 feet per mile. Areas surrounding Travis AFB have a varied topography.

The Travis AFB area has a Mediterranean climate, with wet winters and dry summers. The Base is located near the Carquinez Straits, which is the major break in the Coast Range. Travis AFB usually experiences mild temperatures because of its proximity to the Carquinez Straits and the coast. The mean annual temperature is 60 degrees Fahrenheit (°F). The lowest temperatures occur in January, with a mean of 46°F. The highest temperatures occur in July and August, with a mean of 72°F. Monthly mean relative humidity typically ranges from a low of 50% in June to a high of 77% in January. The mean annual relative humidity is 60.5%.

Travis AFB averages 17.5 inches of rain annually. Approximately 84% of the annual precipitation falls during the winter season of November through March. January is the wettest month, averaging 3.7 inches of precipitation; July is the driest month, averaging 0.02 inch of precipitation. Potential evapotranspiration (ET) ranges from about 50 to 75 inches per year.

Travis AFB experiences sea breezes during the summer because of its proximity to the Carquinez Straits. The average annual wind speed is 8 knots, with a winter average of 5 to 6 knots and a summer average of 12 knots. The predominant wind directions are from the southwest and west-southwest.

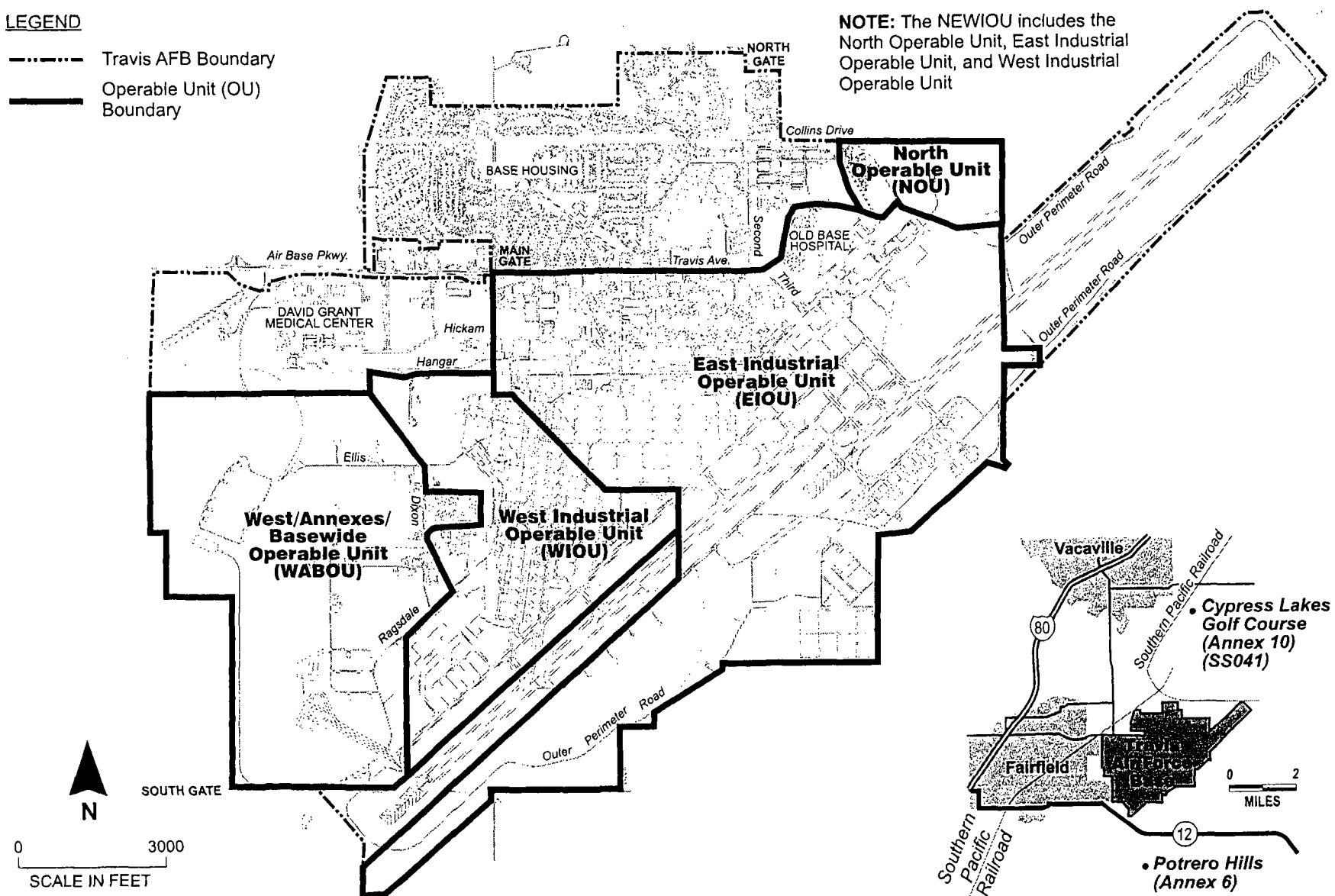
1.2 Land Use

Travis AFB occupies over 6,383 acres of land near the center of Solano County, California, and is approximately 3 miles east of downtown Fairfield and 8 miles south of downtown Vacaville. Solano County's population in 1990 was 340,421 (U.S. Department of Commerce/U.S. Bureau of the Census, 1990). In 2000, the population of Solano County was 394,542; the populations of

LEGEND

- Travis AFB Boundary
- Operable Unit (OU) Boundary

NOTE: The NEWIOU includes the North Operable Unit, East Industrial Operable Unit, and West Industrial Operable Unit



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Figure II-1-1. Travis AFB and Operable Units

Fairfield and Vacaville were 96,178 and 88,625, respectively (U.S. Department of Commerce, U.S. Bureau of the Census, 2000).

According to the Travis AFB Office of Public Affairs, Travis AFB currently employs about 7,315 active military personnel and 3,549 reservists. Approximately 7,732 people live on Base in the 2,736 family housing units and 22 dormitories. There are 3,494 civilians employed at Travis AFB. Approximately 17,000 people are on base daily.

The land use areas of Travis AFB are grouped into eight functional categories.

- **Mission**—Uses are closely associated with the airfield and include facilities such as maintenance hangars and docks, avionics facilities, and other maintenance facilities. Aircraft operations facilities include control towers, Base operations, flight simulators, and other instructional facilities.
- **Administrative**—Uses include personnel, headquarters, legal, and other support functions.
- **Community**—Uses include both commercial and service activities. Examples of commercial uses include the Base Exchange, dining halls, service station, and clubs; service uses include the schools, chapel, library, and family support center.
- **Housing**—Uses include both accompanied housing for families and unaccompanied housing for singles, temporary personnel, and visitors.
- **Base Support/Industrial**—Uses are for the storage of supplies and maintenance of Base facilities and utility systems.
- **Medical**—Uses include facilities for medical support, including the David Grant Medical Center.
- **Outdoor Recreation**—Uses include ball fields, golf course, equestrian center, swimming pools, and other recreational activities.
- **Open Space**—Uses are to provide buffers between Base facilities and to preserve environmentally sensitive areas.

The lands surrounding Travis AFB on the northeast and east are primarily used for ranching and grazing. Areas to the south are a combination of agricultural and marshland. A few commercial/light industrial areas are present to the north of the Base. The area west of Travis AFB is predominantly residential.

Land use within the NEWIOU consists of open grasslands, light industrial support areas, administrative areas, personnel training areas, ammunition storage areas, and service/storage areas.

1.3 Ecology

Travis AFB has a variety of terrestrial and aquatic/wetland habitats and wildlife that are typical of the region. The information used in identifying biological resources was taken from field studies and reports produced by Biosystems Analysis, Inc. (Biosystems) (1993a, b; 1994), CH2M

HILL (1996), Jacobs Engineering Group, Inc. (JEG) (1994a, b), Radian (1994), and Weston (1995a,b).

1.3.1 Terrestrial Habitats

The terrestrial habitats at Travis AFB and in adjacent areas consist of herbaceous-dominated habitats (annual grassland, pasture, and early ruderal habitat) and urban habitat (industrial areas, lawns, and ornamental plants), according to the California Department of Fish and Game (CDFG) classification system (Mayer and Laudenslayer, 1988). Aquatic/wetland habitats at Travis AFB include riverine (Union Creek) and riparian habitat, lacustrine habitat (Duck Pond), and herbaceous-dominated wetlands, marshes, and vernal pools.

In general, annual grassland habitat is dominated by non-native plant species, such as slender wild oat (*Avena fatua*), fescues (*Festuca*), soft chess (*Bromus hordeaceus*), field bindweed (*Convolvulus arvensis*), and yellow star-thistle (*Centaurea solstitialis*). Some native plants, such as bunchgrass (*F. viridula*) and johnny-tuck (*Triphysaria eriantha*) also may be found, usually associated with undisturbed areas.

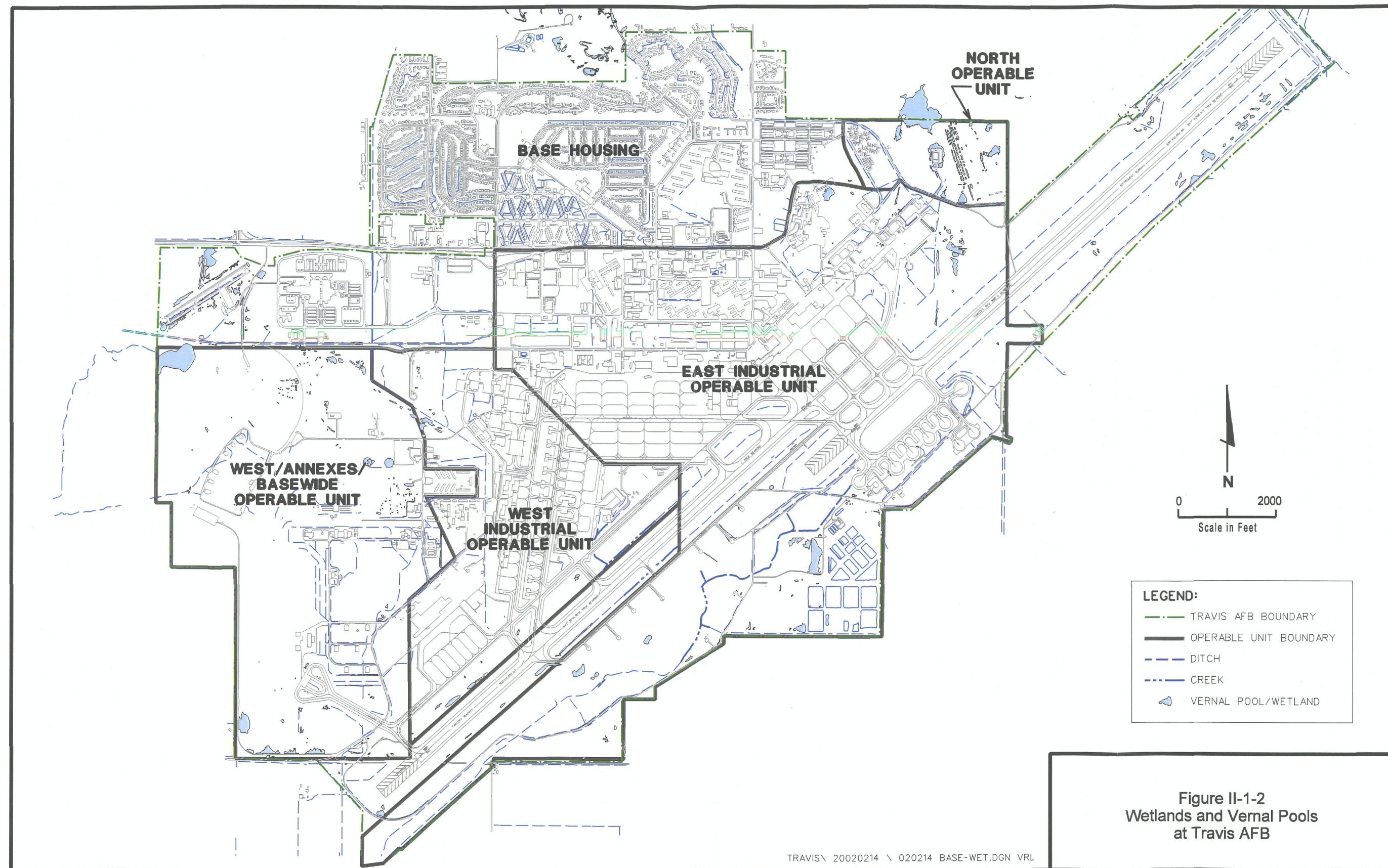
Mowed/disked grassland is generally composed of soft chess, Italian ryegrass (*Lolium multiflorum*), and wild oats. Pasture grassland can contain varying frequencies of filaree (*Erodium* sp.), ripgut brome (*Bromus diandrus*), soft chess, Italian ryegrass, and yellow star-thistle. Ruderal grasslands, on the other hand, contain higher numbers of perennial species and, in some areas, woody species, such as coyote brush (*Baccharis pilularis*), eucalyptus (*Eucalyptus* sp.), Peruvian pepper-tree (*Schinus molle*), and black locust (*Robinia pseudoacacia*).

The urban habitat on base contains maintained lawns as well as trees and shrubs, such as eucalyptus, Fremont cottonwood (*Populus fremontii*), arroyo willow (*Salix lasiolepis*), and coyote brush. Most isolated stands of shrubs or trees are located within or near urban areas and permanent water sources or near artificial surface mounds (for example, rail lines, blast protection, and building/road foundations).

1.3.2 Aquatic/Wetland Habitats

Herbaceous wetland vegetation is found along the permanent (natural or artificial) drainages on base and can also occur seasonally within vernal pools, swales, and ditches. Native species include salt grass (*Distichlis spicata*); non-native species include meadow fescue (*Festuca elatior*), sickle grass (*Parapholis incurva*), and cattails (*Typha* sp.). Vernally inundated areas support seasonal vegetation, such as non-native Mediterranean barley (*Hordeum murinum* ssp. *leporinum*) and brass buttons (*Cotula coronopifolia*), and native plants, such as downingia (*Downingia* sp.) and toad rush (*Juncus bufonius*).

Vernal pools are shallow depressions or small, shallow pools that fill with water during the winter rainy season, dry out during the spring, and become completely dry during the summer. The vernal pools at Travis AFB contain indicator species, such as goldfields (*Lasthenia fremontii*), coyote thistle (*Eryngium yaseyi*), dwarf woolly-heads (*Psilocarphus brevissimum*), water pygmy-weed (*Crassula aquatica*), and one or more species of downingia and popcornflower (*Plagiobothrys* sp.). Figure II-1-2 shows the vernal pools at Travis AFB.



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Although a few willows and coyote brush can be found along Union Creek, the dominant plant species found in the riparian zone of Union Creek are mainly herbaceous and consist of beardless wild rye (*Leymus triticoides*), broad-leaved pepperwort (*Lepidium latifolium*), Harding grass (*Phalaris aquatica*), and saltgrass. Hydrophytes, such as cattails and rushes, are also common.

1.3.3 Wildlife

Terrestrial vertebrates associated with the non-native annual grasslands are commonly found on base. Typical avian species include the ring-necked pheasant (*Phasianus colchicus*), American kestrel (*Falco sparverius*), American robin (*Turdus migratorius*), and western meadowlark (*Sturnella neglecta*). Reptiles observed, or potentially occurring, at the Base include the western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis melanoleucus*), western pond turtle (*Pseudemys marmorata*), and California red-sided garter snake (*Thamnophis sirtalis* ssp. *infernalis*). Common mammals identified include deer mouse (*Peromyscus maniculatus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), black-tailed hare (*Lepus californicus*), and red fox (*Vulpes vulpes*).

Permanent wetlands and seasonally wet areas support aquatic invertebrates, fish, amphibians, reptiles, birds, and mammals. Some aquatic invertebrate species observed in herbaceous wetlands and vernal pools at Travis AFB include vernal pool fairy shrimp (*Branchinecta lynchi*), damselflies, crayfish, and aquatic snails. Amphibian species identified include bullfrog (*Rana catesbeiana*) and Pacific tree frog (*Hyla regilla*). Aquatic birds observed on or near the Base include mallard (*Anas platyrhynchos*), great egret (*Casmerodius albus*), and great blue heron (*Ardea herodias*).

Because wildlife use riverine and riparian habitat somewhat similarly, these habitats are discussed together. Many aquatic invertebrates and amphibians are the same as those discussed above for herbaceous wetlands and vernal pools. These include damselflies, crayfish, aquatic snail, bullfrog, Pacific tree frog, and California tiger salamander (*Ambystoma californiense tigrinum*), although no tiger salamanders have been observed at Travis AFB. Fish species include mosquitofish (*Gambusia affinis*), fathead minnow (*Pimephales promelas*), threespine stickleback (*Gasterosteus aculeatus*), bluegill (*Lepomis macrochirus*), and fall or late fall run chinook salmon. Riverine/riparian habitats also are used extensively by birds and terrestrial mammals for forage and shelter and as a source of water. These include the red-winged blackbird (*Agelaius phoeniceus*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), and river otter (*Lutra canadensis*).

Habitats that support special-status species are considered sensitive habitats. Sensitive aquatic/wetland areas include vernal pools, swales, and ditches that can support special-status plants and animals. Urban environments, scattered throughout the Base, also can support special-status species. For example, burrowing owls (*Speotyto cunicularia*) may use man-made culverts, perches, and bare earth areas that contain burrows provided by ground squirrels. Loggerhead shrikes (*Lanius ludovicianus*) may nest on antenna wires and forage in grasslands. Both owls and shrikes are typical species of the grassland habitats on base. Also, vernal pool fairy shrimp have been found in artificially created depressions that seasonally fill with water.

1.4 Geology and Hydrogeology

This section provides a discussion of the regional geologic setting near Travis AFB and specific geologic conditions in the NEWIOU.

1.4.1 Geology and Soils

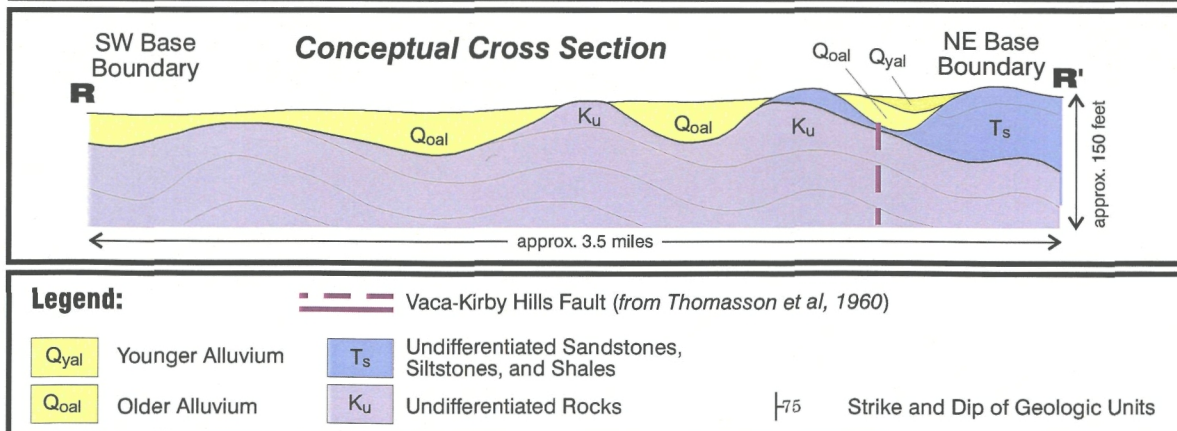
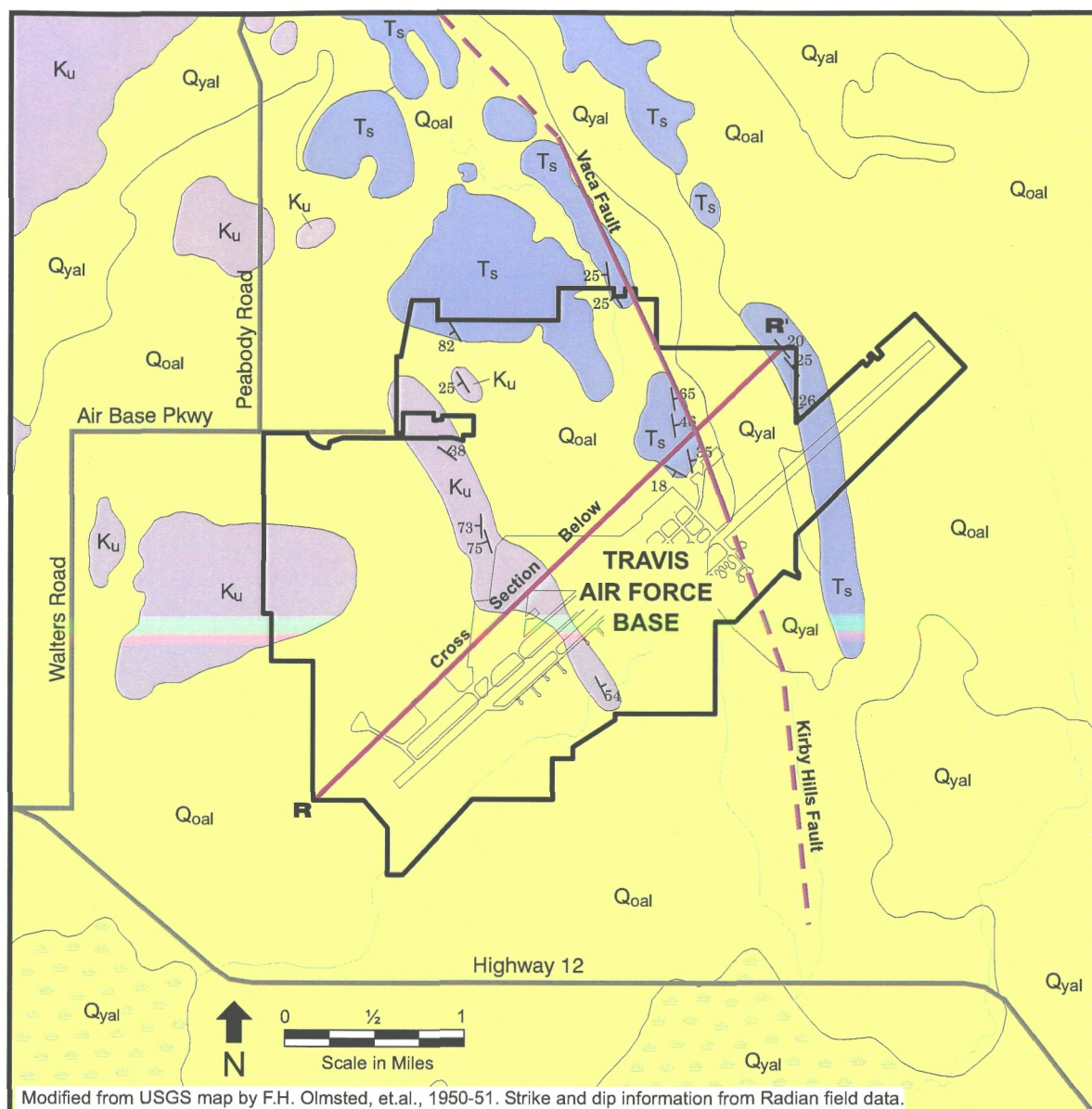
Travis AFB is on the western edge of the Sacramento Valley segment of the Great Valley Geomorphic Province. This province is a sediment-filled synclinal basin with a northwest-to-southeast-oriented axis. The Coast Range Geomorphic Province lies just to the west of Travis AFB (Thomasson et al., 1960; Olmsted and Davis, 1961).

Bedrock units that outcrop in the vicinity of Travis AFB include (from oldest to youngest) the Domengine Sandstone, the Nortonville Shale, the Markley Sandstone, the Neroly Sandstone, and the Tehama Formation. Figure II-1-3 is a geologic map and generalized cross-section illustrating the shallow bedrock units and alluvium in the area surrounding Travis AFB. Bedrock at the NEWIOU has been defined as consisting of consolidated to semi-consolidated sedimentary rock. It has been distinguished from the overlying unconsolidated sediment by such criteria as fissility, cementation, bedding, blow counts, color, texture, and gradation into competent rock (Weston, 1995a). Because of its lower permeability, relative to the unconsolidated alluvium that overlies it, the bedrock may form a boundary for groundwater flow and therefore influence the migration of contaminants in groundwater. Table II-1-1 is a stratigraphic column that summarizes the lithology and age of the geologic units in the area.

Outcrops of the relatively resistant Markley and Domengine Sandstones form most of the topographic high points on the Base, including the hill at the old Base hospital, the low ridge along the boundary between the WIOU and the EIOU, near the center of Travis AFB, and the hills north of Travis AFB. Erosion of the less resistant bedrock units, such as the Nortonville Shale, formed low areas that were later filled with alluvium. Three major subsurface bedrock ridges have been identified in the EIOU: the Eastern Ridge, the Central Ridge, and the Western Ridge (Weston, 1995a). These areas have bedrock at 20 feet below ground surface (bgs) or less. The three ridges are anticlines that plunge slightly towards the south—as does the surface elevation in these areas. The material between these anticlines is alluvium—predominantly silts and clays with intermittent sand lenses. The Western Ridge bisects the EIOU and the WIOU. The bedrock consists of poor to moderately indurated (cemented) sandstone.

Travis AFB is on the northeastern margin of the Fairfield-Suisun Basin, astride the Vaca Fault. The Vaca Fault runs through the Central Ridge in a south-southeastern direction and is mapped as a fault with late Quaternary (during the past 700,000 years) activity (Jennings, 1994). No historic activity has occurred on this fault. Travis AFB lies on alluvial fans (drainages between parent rocks that have filled with alluvium) that extend from the Vaca Mountains to the Suisun Marsh, referred to as older and younger alluvium. At Travis AFB, the overall thickness of the alluvium ranges from 0 to approximately 70 feet but is generally less than 50 feet. West of Travis AFB, the thickness of the alluvium increases to over 200 feet (Thomasson et al., 1960).

The Tehama Formation consists of poorly sorted deposits of clay, silt, clayey silt, sandy silt and clay, and silty sand containing generally thin lenses of gravel and sand. In areas of outcrop, it consists chiefly of siltstone, sandstone, and conglomerate (Page, 1986). The thickness of the



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Figure II-1-3. Geologic Map of Travis AFB and Vicinity

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Table II-1-1

Stratigraphic Column of Geologic Units at Travis AFB

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Million Years Ago	Era	Period	Epoch	Geologic Unit	Lithologic Description	Possible Range of Thickness
1.8	Cenozoic	Quaternary	Pleistocene and Recent	Younger Alluvium	Interbedded clays, silts, sands and gravels; continental	0–70 feet
				Older Alluvium	Interbedded clays, silts, sands, and gravel; continental	0–100 feet
				Bay Mud	Interbedded clays, silts, sands and gravel; continental	
5			Pliocene	Tehama Formation	Interbedded gravels, sands, silts and clays, partially consolidated, occasional volcanoclastic sediments; continental	
Unconformity						
27.5		Tertiary	Miocene	Neroly Sandstone (San Pablo Group)	Interbedded sandstone, siltstone, and shale; distinctive bluish color; marine	0–60 feet
Unconformity						
38			Oligocene			
55			Eocene	Markley Sandstone	Massive micaceous, arkosic sandstone, interbeds of siltstone and shale; marine	0–60 feet
				Nortonville Shale	Predominantly dark gray marine shale and siltstone, minor sandstone, coal and glauconitic sandstone unit	80 feet
				Domengine Sandstone	Coarse-grained sandstone, minor siltstone and shale interbeds, gray to brown; marine (in outcrop only as mapped by Sims et al., 1973).	50 feet
			Paleocene	Unnamed Formation	Interbedded shale, siltstone, and thinly laminated friable sandstone; marine (as mapped by Sims et al., 1973)	

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Source: Sims et al., 1973.

formation beneath the NEWIOU is unknown. Some topographic relief in the form of very low ridges is provided by near-surface bedrock or outcrops of sedimentary rocks characterized as bedrock in the Travis AFB area.

The younger and older deposits are distinguished at the surface by the difference in the maturity of their soil profiles. The portion of the alluvium near the ground surface has been altered, or weathered, over time by physical, chemical, and biological actions. The Younger

Alluvium generally has an immature soil profile; the Older Alluvium generally has a well-developed, mature soil profile. Most of the sediment encountered at Travis AFB consists of Older Alluvium. The Younger Alluvium overlies the Older Alluvium and is found only in the northeastern portion of the Base.

Soils in the vicinity of Travis AFB are classified as alfisols, which are primarily silt and clay loams that exhibit low permeabilities and poor drainage characteristics. Most of the Base, including the NEWIOU, is covered with soils derived from older alluvium designated as the Antioch-San Ysidro Complex. These soils are predominantly sandy loams with clay and clay loams 12 to 30 inches below the surface. The soils are old and are characterized by a well-developed soil profile that includes a well-defined clay hardpan beneath the surface that limits the percolation of water.

1.4.2 Hydrogeology

Travis AFB is located along the northeastern edge of the Fairfield-Suisun Hydrogeologic Basin. The basin is a hydrogeologically distinct structural depression adjacent to the Sacramento Valley segment of the Central Valley Province. The basin is bordered to the north by the Vaca Mountains and to the east by the ridge that runs along the eastern portion of the NOU and EIOU. The basin slopes south toward the Suisun Marsh; consequently, groundwater and surface water at Travis AFB tend to flow south to Suisun Marsh (California Department of Water Resources, Central District, 1994).

The primary water-bearing deposits in the region surrounding Travis AFB are the coarse-grained sediments (sand and gravel) within the Older Alluvium and Younger Alluvium. Depth to groundwater varies seasonally from 0 to 12 feet bgs. The bedrock units generally do not yield groundwater of usable quantity or quality in the Fairfield-Suisun Hydrogeologic Basin (Thomasson et al., 1960).

Groundwater recharge occurs from the direct infiltration of rainfall on the ground surface and from the infiltration of runoff through depressions and local creek beds. Natural groundwater discharge may occur in the ditches and branches of Union Creek that flow into Suisun Marsh, as well as directly into the marshlands near the Potrero Hills, south of Travis AFB (Thomasson et al., 1960). When the water table elevation intersects the ground surface in an area with a high water table, discharge of groundwater occurs. Groundwater is likely to infiltrate the storm sewer system in the storm sewer right-of-way, of which Union Creek is a continuation (Weston, 1995a). There is also a connection between groundwater and surface water at the vernal pools on base; however, the hydraulic connection has not been quantified. Depth to groundwater changes seasonally, depending on the amount of rainfall and subsequent infiltration. Thus, at the end of the dry season, depths to groundwater are greater than during the rainy season.

The groundwater gradient results from the differences in hydraulic potential and indicates the direction of groundwater flow. The general direction of groundwater flow within the alluvium at Travis AFB is southerly, similar to the regional gradient. However, local variations (groundwater mounds and depressions) exist within the boundaries of Travis AFB. Alluvium is between 0 and 70 feet thick, and the magnitude of the hydraulic gradient varies with the thickness. The groundwater contours are closer (i.e., the gradient is steeper) in areas where alluvium is thinner (i.e., the bedrock ridges). The change in gradient is due to the decreasing thickness of the more permeable alluvium and the increasing thickness of the less permeable

bedrock. For example, gradients are steep at LF007, where bedrock is close to the surface, and flatten out at FT004, where bedrock is deeper beneath the surface and the saturated alluvium thickens.

The typical upper end of horizontal gradients in the upper portion of the aquifer at Travis AFB is approximately 0.02 (vertical foot per horizontal foot) at the groundwater mound near the old base hospital. A typical lower end horizontal gradient in the upper portion of the aquifer is approximately 0.002 near the southern border of Travis AFB. The average magnitude of the groundwater gradient in the upper portion of the aquifer at Travis AFB is approximately 0.005. The horizontal hydraulic gradients in the deep portion of the aquifer range from 0.01 to 0.003.

Hydraulic conductivities vary from 0.0001 to 0.079 feet per minute based on the aquifer tests conducted at Travis AFB, depending on grain size and sorting observed in the alluvial units.

1.4.3 Groundwater Use

Intensive extraction of groundwater generally occurs only to the west of Travis AFB and Fairfield, where the alluvium is thicker and contains a greater abundance of coarse-grained sediment. Groundwater wells in the area of Travis AFB are limited to domestic, stock watering, and irrigation wells, with typical screened depths within 100 feet of the ground surface (Weston, 1995a). Domestic wells, several of which are downgradient from Travis AFB, are used typically for households and gardens (Weston, 1993). Solano County does not supply water to the residences surrounding Travis AFB. The two nearest domestic wells are within 1,700 feet of the southern boundary of Travis AFB.

Several wells 4 miles north of Travis AFB, at the Cypress Lakes Golf Course (Annex 10), produce 400 to 500 million gallons of water per year. This well water is mixed with surface water purchased from the City of Vallejo to supply potable water to Travis AFB. The Fairfield public water supply field is approximately 3 miles west of Travis AFB. The large production wells at the golf course and in Fairfield tend to be deeper than the nearby domestic wells, ranging to 1,000 feet deep.

No on-base wells are used for potable water production. However, numerous wells are used to extract contaminated groundwater, which is then treated at one of the groundwater treatment plants. Extraction wells located on base yield groundwater at a range of less than 1 gallon per minute (gpm) (several extraction wells within the WIOU) to approximately 12 gpm (EW605x16 in the EIOU). Groundwater contamination from Travis AFB does not affect Fairfield's water supply, and remedial actions implemented by Travis AFB are and will be protective of Fairfield's wells.

1.5 Surface Water

Travis AFB is in the northeastern portion of the Fairfield-Suisun Hydrologic Basin. Within the basin, water generally flows south to southeast toward Suisun Marsh, an 85,000-acre tidal marsh that is the largest contiguous estuarine marsh, as well as the largest wetland, in the continental United States. Suisun Marsh drains into Grizzly and Suisun Bays. Water from these bays flows through the Carquinez Straits to San Pablo Bay and San Francisco Bay, and ultimately discharges into the Pacific Ocean near the City of San Francisco.

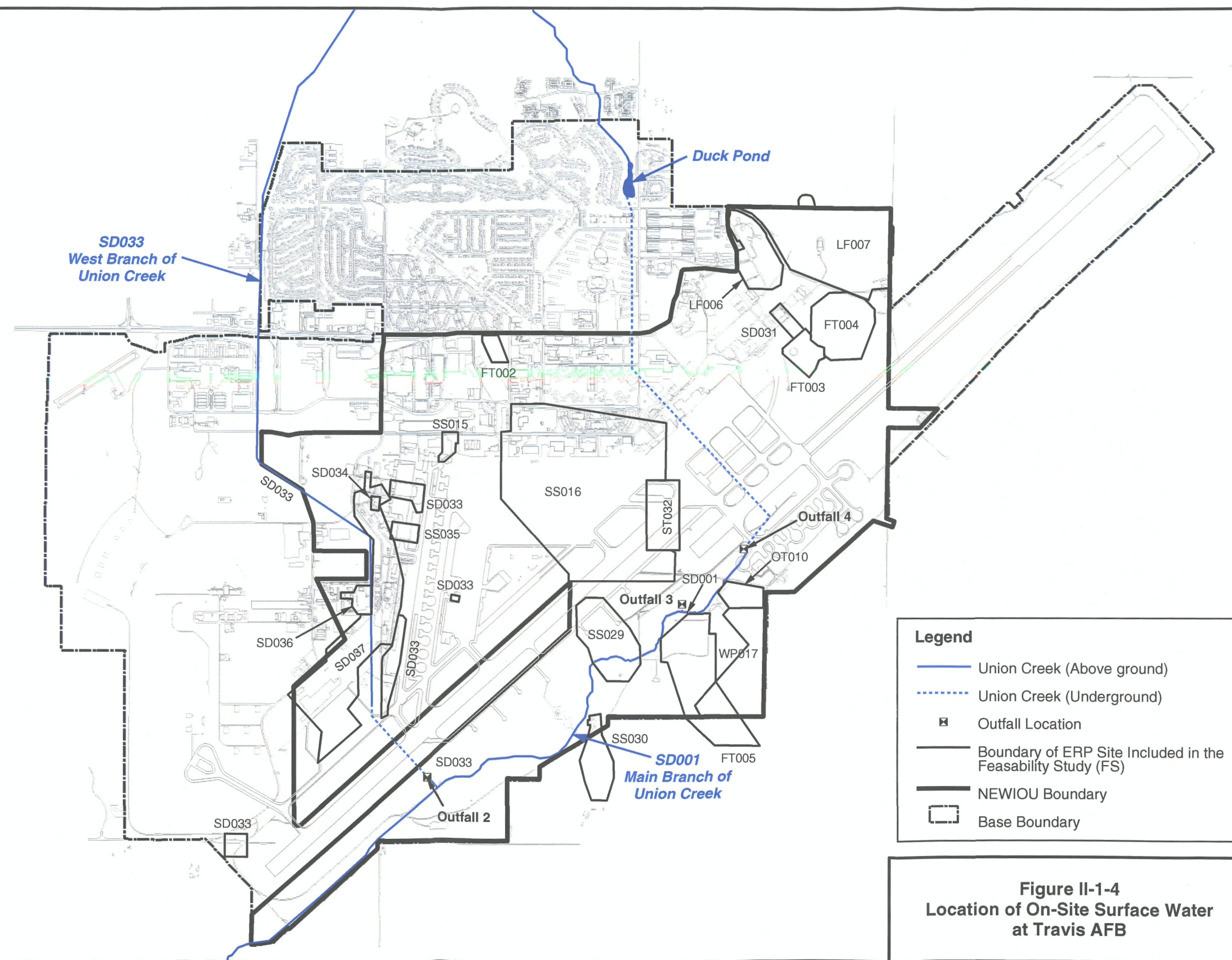
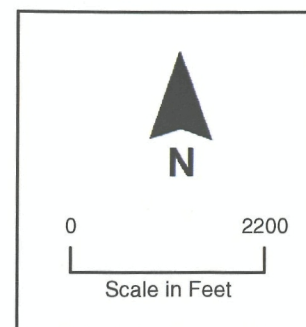
Union Creek is the primary surface water pathway for runoff at Travis AFB (Figure II-1-4). The headwaters of Union Creek are approximately 1 mile north of the Base, near the Vaca Mountains, where the creek is an intermittent stream. Union Creek splits into two branches north of the Base, with the main (eastern) branch being impounded into a recreational pond designated as the Duck Pond. At the exit from the Duck Pond, the creek is routed through a storm sewer to the southeastern Base boundary, where it empties into open creek channel.

The West Branch of Union Creek flows south and enters the northwestern border of Travis AFB east of the David Grant Medical Center in an excavated channel. This channel flows south to the northeastern corner of the WABOU and continues southeast along the western side of the WIOU until flow in the channel is directed to a culvert under the runway and discharges to the main channel of Union Creek at Outfall II. From Outfall II, Union Creek flows southwest and discharges into Hill Slough, a wetland located 1.6 miles from the Base boundary. Surface water from Hill Slough flows into Suisun Marsh.

Local drainage patterns have been altered substantially within the Base by the rerouting of Union Creek, the construction of the aircraft runway and apron, the installation of storm sewers and ditches, and general development (e.g., the Base Exchange, industrial shops, maintenance yards, roads, housing, and other facilities). Surface water is collected in a network of underground pipes, culverts, and open drainage ditches. The surface water collection system divides the Base into eight independent drainage areas. The eastern portion of the Base is served by one of the drainage systems that collects runoff from along the runway and the inactive sewage treatment plant area and directs it to Denver Creek and Denver Slough. Denver Creek is an intermittent stream in the vicinity of the Base. The northwestern portion of the Base drains to the west toward the McCoy Creek drainage area. McCoy Creek is also an intermittent stream in the vicinity of the Base. With the exception of these drainages, the remaining six drainage areas at the Base empty into Union Creek.

Travis AFB has limited topographic relief, and the clayey soils prevent rapid drainage. This swale topography leads to the formation of vernal pools. The annual cycle of vernal pools includes standing water during the winter and spring and desiccation during the summer and fall. During the time that the vernal pools contain water, biotic communities develop over relatively restricted areas. In the larger areas, grasslands form; in more confined, deeper areas, wetlands form. The vernal wetlands are concentrated along the western, southern, and southeastern boundaries of the Base. All of the surface water bodies on and in the vicinity of the Base empty into the Suisun Marsh. No springs have been recorded within the confines of Travis AFB.

Surface water pathways, as defined in this NEWIOU SSSW ROD, include Union Creek, drainage channels, the storm and sanitary sewer system, and the backfill material surrounding underground sewer lines.



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2.0 Overview of Travis AFB Restoration Branch and Environmental Programs

The Travis AFB Environmental Management Office is divided into four branches: Compliance, Restoration, Conservation, and Pollution Prevention. This section describes the Restoration Branch and the programs that are designed to comply with current federal and state environmental regulations.

The Restoration Branch manages the Travis AFB Environmental Restoration Program (ERP), which was initiated in 1983 to investigate the nature and extent of reported hazardous waste releases to the surrounding environment (Engineering-Science, 1983). On the basis of the evaluation of ERP data by the United States Environmental Protection Agency (U.S. EPA), Travis AFB was placed on the National Priorities List (NPL) on 21 November 1989 (54 Federal Register 48187).

The Air Force, U.S. EPA, California Environmental Protection Agency's Department of Toxic Substances Control (Cal-EPA/DTSC), and San Francisco Bay Regional Water Quality Control Board (RWQCB) negotiated and signed a Federal Facility Agreement (FFA) in September 1990. The FFA is a legally binding document that establishes the framework and schedules for the environmental cleanup at Travis AFB. This document also requires Air Force compliance with the NCP, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and other federal and state laws and regulations that are ARARs.

2.1 Management Action Plan and Travis AFB General Plan

The Travis AFB Management Action Plan (MAP) summarizes the current status of the Travis AFB environmental compliance, restoration, and pollution prevention programs and presents a comprehensive strategy for implementing response actions necessary to protect human health and the environment. Travis AFB updates the MAP annually. Travis AFB environmental staff and Air Force headquarters use the MAP to direct and monitor environmental response actions and to schedule activities needed to resolve technical, administrative, and operational issues.

The Travis AFB General Plan provides an organized, systematic, and comprehensive approach to current and future planning and development. The Base General Plan is a tool that addresses a multitude of installation requirements and assists in the long-range growth of the Base, including natural resources, environmental protection, land use, airfield operation, utilities, transportation, and architectural compatibility. Of particular importance is its role in environmental protection. The Base General Plan addresses proper hazardous waste management and recognizes CERCLA-related activities through proper land use at Travis AFB. The Travis AFB Community Planner maintains the Base General Plan. Section 5.4 of this ROD addresses the incorporation of land use controls and soil and sediment disturbance restrictions into the Base General Plan based on CERCLA-related activities.

2.2 CERCLA Process

CERCLA was passed in 1980 and amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986. This law established a program to remediate sites contaminated with hazardous constituents to protect public health and the environment. CERCLA established a series of steps to investigate site contamination and design and implement appropriate remedial actions at these sites. The major CERCLA steps are described hereafter.

2.2.1 Remedial Investigations (RIs)

Separate RIs were conducted for each of the three operable units (OUs) within the NEWIOU. These RIs were used to collect data to characterize site conditions, to determine the nature of the waste, and to assess risk to human health and the environment. The NEWIOU RIs used phased and sequenced approaches to minimize the collection of unnecessary data and maximize data quality. Initial data collection efforts provided a basic understanding of site characteristics. As this basic understanding was achieved, subsequent data collection efforts focused on filling identified data gaps in the conceptual site models (CSMs) and gathering the information necessary to support evaluations of remedial alternatives. The results and conclusions of these investigations were published in the three RIs (i.e., the NOU RI [Radian, 1995], the EIOU RI [Weston, 1995a], and the WIOU RI [Radian, 1996a].

2.2.2 Feasibility Study (FS)

The FS is divided into three general phases: development of alternatives, screening of alternatives, and detailed analysis of alternatives. In the first phase, the technology types and process options available to implement the general response actions for contaminated soil, sediment, surface water, and groundwater were defined. A technology implementability screening was conducted that provided the basis for the selection of representative process options for soil, sediment, surface water, and groundwater remediation. In the second phase, the remedial alternatives were assembled using the representative process options and the site-specific conditions in the NEWIOU. In the last phase, the alternatives were evaluated against seven of the nine CERCLA criteria. The NEWIOU FS provided a comparative analysis of alternatives to identify the advantages and disadvantages of each alternative to assist the decision-making process. The results of this study were published in the NEWIOU FS (Radian, 1996b), which included analyses of all three OUs in the NEWIOU.

2.2.3 Proposed Plan

The Proposed Plan presents to the public the preferred alternative for each site and the rationale for the preferences. The *North/East/West Industrial Operable Unit, Travis Air Force Base, Proposed Plan for Soil, Sediment, and Surface Water* (Travis AFB, 1998a) (NEWIOU SSSW Proposed Plan) gave the public an opportunity to comment on the preferred soil, sediment, and surface water alternatives during a 30-day public comment period (8 July 1998 to 8 August 1998). All community members on the Travis AFB Community Relations list received a copy of the NEWIOU SSSW Proposed Plan just prior to the start of the public comment period. The Air Force formally presented the preferred soil, sediment, and surface water alternatives to the public at the 23 July 1998 public meeting. After completion of the NEWIOU SSSW Proposed Plan, the planning effort at Travis AFB focused on the implementation of basewide interim

groundwater remedial actions and the development of the WABOU Soil ROD. Further development of the NEWIOU SSSW ROD was halted at this point. In the interim, Travis AFB negotiated and executed two groundwater interim records of decision (IRODs) and one large soil ROD, the WABOU Soil ROD (Travis AFB, 2002a). When the WABOU Soil ROD was completed in December of 2002, Travis AFB resumed work on this NEWIOU SSSW ROD.

2.2.4 Record of Decision (ROD)

The ROD presents the selected remedial alternatives and cleanup levels. It summarizes all CERCLA activities at each site and documents that the Air Force and the regulatory agencies are in agreement regarding how the cleanup is to take place. The *Groundwater Interim Record of Decision for the North/East/West Industrial Operable Unit* (Travis AFB, 1997) (NEWIOU Groundwater IROD) and the *Groundwater Interim Record of Decision for the West/Annexes/Basewide Operable Unit* (Travis AFB, 1998b) (WABOU Groundwater IROD) describe the interim remedial actions for the groundwater sites. The Travis Air Force Base WABOU Soil ROD describes the remedial actions for the soil sites in the WABOU (Travis AFB, 2002a).

The development of this NEWIOU SSSW ROD used the RIs, FS, and Proposed Plan as described above, but also used three tech memos as ROD development documents. The three tech memos (Human Health Tech Memo, Eco Tech Memo, and Groundwater Protection Tech Memo) provided site-by-site summaries and maps with RI data and any updated site information. The Eco Tech Memo provided an extensive update of the ecological risk assessment (ERA). After extensive discussion between the Air Force and the regulatory agencies, selected remedial alternatives were included in each tech memo for each site with supporting rationale. The information from the three tech memos was summarized and consolidated in this ROD. Additional information on the approach used in this ROD is provided in the introduction to Part II (Decision Summary) (Page II-Intro-1). Sections 5.2.3, 5.2.4, and 5.2.5 discuss each of the tech memos in more detail.

2.2.5 Remedial Design (RD)

The RD specifies the engineering design used to implement the selected alternative at each site.

2.2.6 Remedial Action (RA)

The RA is the construction and operation of the selected alternatives specified in the ROD and designed in the RD. The Air Force will submit a schedule for the RD/RA activities to the regulatory agencies 21 days after the NEWIOU SSSW ROD is signed.

2.3 Operable Units

2.3.1 Scope and Role of Operable Units at Travis Air Force Base

Initially, Travis AFB was treated as a single entity with one associated comprehensive cleanup schedule. However, as with many Superfund sites, the problems at Travis Air Force Base are complex and involve many separate sites with contamination in various media (soil, sediment, surface water, and groundwater). Therefore, In May 1993, Appendix A (Deadlines) of the FFA was revised, and the Base was divided into four OUs of a more manageable size to facilitate the overall cleanup program. The OUs and media of concern in each OU are as follows:

- East Industrial Operable Unit (EIOU) with soil, sediment, surface water, and groundwater contamination;
- West Industrial Operable Unit (WIOU) with soil and groundwater contamination;
- North Operable Unit (NOU) with soil and groundwater contamination; and
- West/Annexes/Basewide Operable Unit (WABOU) with soil and groundwater contamination.

Operable unit boundaries are shown in Figure II-1-1. Separate RIs were conducted for each of the OUs. In October 1995, the first three OUs were combined (because of the similarity of contaminants found in the RIs for those OUs), and together are referred to as the North/East/West/Industrial Operable Unit, or NEWIOU.

2.3.2 NEWIOU Description

The following three OUs are within the NEWIOU.

- North Operable Unit—The NOU includes two inactive landfills (Landfills 1 and 2). Landfill 1 (LF006) was in use from 1943 until the early 1950s, when operation of Landfill 2 (LF007) was begun (Radian, 1995). Landfill 1 was used as a burn-and-fill landfill, primarily for disposing of general refuse. Based on risk assessments performed for Landfill 1, no further evaluation was recommended for soil, sediment, or surface water in the RI. Landfill 2, operated from the early 1950s until 1974, also was used for general refuse disposal using a trench-and-fill method. In addition to open fields, large vernal pool complexes are present at Landfill 2.
- East Industrial Operable Unit—The EIOU, the largest OU, covers approximately 1,726 acres and includes industrial shops, administration facilities, runways, taxiways, an aircraft parking apron, an inactive sewage treatment facility and associated ponds, open fields, vernal pools, and Union Creek.
- West Industrial Operable Unit —The WIOU is located in the west-central portion of Travis AFB and includes facilities related to the maintenance and repair of C-141 and C-5 aircraft. Facilities include aircraft taxiways, a refueling area, fuel storage areas, and portions of three pipeline systems: the fuel distribution pipeline, Storm Sewer System II (formerly Storm Sewer System B), and the sanitary sewer. Several sites were combined because of geographic proximity or commingling of contaminants (Radian, 1996a). The combined sites are as follows:
 - Facilities 810 and 1917, Storm Sewer System II, and the South Gate Area (SD033)
 - Facility 811 (SD034)
 - Facilities 818/819 (SS035)
 - Facilities 872, 873, and 876 (SD036); and
 - Sanitary Sewer System including Facilities 837, 838, 919, 977, 981, the Area G Ramp, and the Ragsdale/V Area (SD037).

2.3.3 WABOU and NEWIOU Status in the Cleanup Process

WABOU Status

In 1998, the WABOU FS (CH2M HILL, 1998a) and WABOU Groundwater Interim ROD (Travis AFB, 1998b) were completed. Interim groundwater actions were designed, constructed, and are in operation. Until a Basewide Groundwater ROD is completed, Travis will continue to operate the extraction and treatment systems implemented by the WABOU Groundwater IROD, which will reduce contamination in the groundwater. In December 2002, the U.S. EPA and Travis AFB co-selected remedial actions for soil sites in the WABOU. Remedial soil actions have been designed, and actions are complete except for one site (SD045-Former Small Arms Range), which is planned for 2007.

NEWIOU Status

Fifty-nine sites with potential contamination resulting from past industrial activities were originally identified during the NOU RI, EIOU RI, and WIOU RI. After the RIs, these three OUs were merged into the NEWIOU for purposes of the FS, Proposed Plan, and ROD. In 1996, the NEWIOU FS (Radian, 1996b) was finalized on 12 September with agency concurrence. In 1997, the U.S. EPA and Travis AFB co-selected interim remedial actions for groundwater in the NEWIOU, as documented in the NEWIOU Groundwater Interim ROD (Travis AFB, 1997). Interim groundwater actions were designed, constructed, and are in operation. Until the Basewide Groundwater ROD is completed, Travis will continue to operate the pump and treat systems implemented by the NEWIOU Groundwater IROD, which will reduce contamination in the groundwater and contain plume migration.

The NEWIOU SSSW Proposed Plan (Travis AFB, 1998a) was completed in 1998, and was submitted for public comment on 8 July 1998. After completion of this Proposed Plan, the planning effort at Travis AFB focused on the development of the NEWIOU and WABOU Groundwater IRODs, the implementation of interim groundwater remedial actions, and the development of the WABOU Soil ROD. When the WABOU Soil ROD was completed in December of 2002, Travis AFB resumed work on the NEWIOU SSSW ROD.

This NEWIOU SSSW ROD presents the remedial actions co-selected by the U.S. EPA and Travis Air Force Base to address contamination in soil, sediment, and surface water in the NEWIOU.

2.4 Removal Actions

Travis AFB has initiated one groundwater removal action and several interim remedial actions in the NEWIOU that are described in the NEWIOU Groundwater IROD (Travis AFB, 1997). A soil removal action was initiated at NEWIOU Site SS015 in 2003, as described in the *Soil Removal Action Summary Report for North/East/West Industrial Operable Unit Soil Removal Action at Site SS015, Travis AFB, California* (Environmental, Inc., 2003).

2.5 Risk Assessment

Human health risk assessments (HHRAs) and ERAs were conducted during the NOU, EIOU, and WIOU RIs. The results of these assessments are summarized in Section 3.0. In addition, the potential ecological risks to plants and animals were quantified from a basewide perspective

and were presented in the *Final Comprehensive Basewide Ecological Risk Assessment - Tier 2 Screening Assessment, Travis Air Force Base, California* (CH2M HILL, 1996). An updated ecological risk assessment was conducted in the *Final Ecological Technical Memorandum for the NEWIOU* (URS, 2005). The NEWIOU Eco Tech Memo provided a Tier 2 risk-based ecological evaluation and built on the findings and conclusions of the previous ERAs in the RIs and the basewide ERA that provided a comprehensive evaluation of Union Creek. In addition, a few new ecological receptors were added to some sites to ensure that all appropriate feeding guilds and trophic levels were represented in the ERA.

2.6 Community Participation

Travis AFB has had a community relations program since 1990. This program is designed to inform the public and involve the community in the environmental decision-making process.

The highlights of the community relations activities implemented by Travis AFB are presented hereafter.

- **Federal Facility Agreement (FFA).** The Air Force, U.S. EPA, Cal-EPA/DTSC, and San Francisco Bay RWQCB have negotiated an interagency agreement that includes requirements for community relations activities based on provisions in federal (and where applicable, state) statutes, regulations, and guidelines.
- **Restoration Advisory Board (RAB).** In 1994, Travis AFB established a RAB comprising representatives of the community and the regulatory agencies. Through its quarterly meetings and its focus groups, the RAB has provided valuable input about community concerns regarding the ERP. The Technical Document Review focus group has reviewed and commented on the draft version of every major report. The Relative Risk focus group has provided input on the project prioritization, and the Community Relations focus group is working to reach out to all community members. The RAB replaced the Technical Review Committee, which met periodically to review program progress.
- **Administrative Record/Information Repository.** The Air Force established an Administrative Record to support Air Force decisions related to the Travis AFB ERP. In addition, the Air Force established a public information repository for the relevant portion of the Administrative Record at the Vacaville Public Library. Copies of RI reports, FS reports, Proposed Plans, and decision documents for the OUs are available for public review.
- **Community Relations Plan (CRP).** The Air Force implemented the first Travis AFB CRP in 1991. The Air Force revised the CRP in 2003. The Travis AFB Remedial Project Manager (RPM) is currently implementing the CRP.
- **Mailing List.** A mailing list of all interested parties in the community is maintained by Travis AFB and updated regularly. The mailing list currently includes more than 1,300 names.
- **Fact Sheets and Newsletters.** The Air Force has been publishing fact sheets describing activities and milestones in the ERP occasionally since 1993. Since 1995, the Air Force has published and mailed quarterly newsletters to everyone on the mailing list. The newsletters

contain information about public participation, issues of potential concern to the public, and program updates. The RAB co-chairs also write columns in each newsletter.

- **Proposed Plans.** The Air Force mailed copies of the NEWIOU SSSW Proposed Plan to all parties on the Travis AFB mailing list, which includes government officials, representatives of interested community groups, and members of the media. To inform the public of changes between the NEWIOU SSSW Proposed Plan and the associated NEWIOU SSSW ROD, the Air Force mailed a fact sheet to the same distribution in 2006. Copies of the Proposed Plan and fact sheet are available at three Solano County libraries (Vacaville, Fairfield, and Travis AFB) for public review.
- **Public Meetings.** The Air Force held a 30-day public comment period for the NEWIOU SSSW Proposed Plan (8 July 1998 to 8 August 1998). The Air Force held a public meeting on the evening of 23 July 1998 to present the preferred remedial alternatives for the NEWIOU sites. In addition, the Air Force held a second 30-day public comment period (16 January 2006 to 15 February 2006) to inform the public of changes in the preferred alternatives and to solicit public input on the new preferred alternatives. The Air Force provided a fact sheet and public notice, and on 26 January 2006 conducted a public meeting with a supplemental handout. These actions provided the public the opportunity to comment on the revised proposed alternatives.

The selected remedies in this ROD are the same as the preferred alternatives identified in the 2006 fact sheet, the 2006 supplemental handout, and at the public meeting, except that the name of the selected remedy for surface water at SD001 and SD033 is changed from "Source Control" to "No Action." As explained in Section 5.8, Section 5.1.1, and footnote c to Tables I-3 and II-5-15, this is a change in the name of the remedy only and not a change in the actual actions to be taken for surface water under this ROD. More specific information on the 2006 public meeting and public response to the NEWIOU public comment periods is provided in Part III (Responsiveness Summary) of this ROD.

2.7 Petroleum-Only Contaminated Sites Program

The Travis AFB Petroleum-Only Contaminated Sites (POCOS) program is designed to manage on-base sites with petroleum-related contamination. Travis AFB and the regulatory agencies agreed to remove the POCOS from the Travis AFB CERCLA program because the law excludes petroleum as a CERCLA contaminant. The Air Force will address petroleum contamination under CERCLA where it is commingled with CERCLA contaminants.

POCOS are typically associated with surface and subsurface releases from fuel spills, piping leaks, oil/water separators (OWS), or underground storage tanks (USTs). The POCOS program includes the removal of leaking USTs and the remediation of petroleum-only-contaminated soil and groundwater. An example of a POCOS that was removed from the CERCLA program by the regulatory agencies and the Air Force is the North/South Gas Station site. The San Francisco Bay RWQCB is the lead oversight agency for this program.

2.8 Remedial Design/Remedial Action

The RD/RA will include the design and implementation of all actions specified in this NEWIOU SSSW ROD. The regulatory agencies will be involved in the approval and oversight of the design and construction of the RAs.

The Air Force will submit the RD/RA schedule for implementing the ROD 21 days after signing the ROD, in accordance with the FFA. The regulatory agencies will review and approve the RD/RA schedule, as well as all reports and actions specified in the RD/RA schedule. The Air Force prepared a *Basewide Soil Remedial Design/Remedial Action (RD/RA) Plan, Travis Air Force Base, California* (Soil RD/RA Plan) (URS, 2002) that covers the general approach for implementing the remedies at all Travis AFB soil sites.

3.0 NEWIOU Remedial Investigation Summary

The primary objectives of the NOU, EIOU, and WIOU RIs were to evaluate the nature and extent of contamination in the NEWIOU and to assess the potential risks to human health and the environment posed by the contamination. Following the RI field activities and data evaluation, each site received an HHRA and ERA. A quantitative HHRA resulted in the identification of COCs for each site and the calculation of site-related excess lifetime cancer risks, as well as hazard indices (HIs) (for non-cancer-causing chemicals) for each COC. Similarly, the ERA resulted in the identification of contaminants of potential ecological concern (COPECs) for each site and the calculation of hazard quotients (HQs) for various ecological receptors (selected indicator species of plants and animals) for each COPEC.

3.1 Nature and Extent of Contamination

In the RIs for the NEWIOU, soil contamination was identified for possible remediation at 18 sites. At 2 of these sites, sediment and surface water contamination also was identified for possible remediation. (Sediment comprises the layer of soil, sand, and minerals that has been deposited by water or wind within permanent water bodies, such as Union Creek, and those within seasonal surface water bodies, such as vernal pools, wetlands, oxidation ponds, and drainage ditches.) The 18 sites included areas that were used for fire training, aircraft maintenance, painting, aircraft washdowns, landfills, and jet fuel distribution. Table II-3-1 provides a brief description of each site. More detailed descriptions are provided in Section 3.3. Figure II-3-1 shows the location of the NEWIOU soil, sediment, and surface water sites and estimated areas of soil contamination identified in the RIs and further evaluated in the NEWIOU FS. Figures in Section 5.0 show contamination in more detail at each site recommended for excavation.

The results of the NOU RI indicated that contaminants from Landfills 1 and 2 have reached the groundwater. The groundwater beneath the landfills is contaminated with volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and dioxins. These constituents also were detected in samples of surface and subsurface soils. Although COCs are present throughout the NOU, the higher COC concentrations are generally located in the central portions of Landfill 2 (LF007).

In the WIOU RI, two primary contaminant types were identified: total petroleum hydrocarbons (TPH) and related compounds, primarily benzene, and chlorinated solvents, primarily trichloroethene (TCE). These contaminants were detected in soil, soil gas, surface water, sediment, and groundwater samples at various locations within the WIOU. TPH and TCE were commingled within the plumes for individual sites, and the plumes from each site had commingled with each other to the point that the groundwater contamination in the WIOU is being treated as one large plume and remediated under CERCLA.

In the EIOU RI, the contaminants detected in soil and groundwater were primarily VOCs, including TCE. Certain metals, dioxin, and PCBs also were detected in samples of sediment, soil, surface water, and groundwater.

Table II-3-1

NEWIOU Site Descriptions

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site		Site Description
Site Name	Designation	
SD001	Union Creek	Site SD001 contains Union Creek and its associated surface water facilities that follow along the main airstrip. Grass and weeds growing along Union Creek are regularly mowed and tilled to prevent birds and other migratory animals from inhabiting the area. PAHs were identified in soil at SD001, and pesticides, PAHs, and metals were identified in the creek sediment. Pesticides and metals were identified in surface water at SD001.
FT002	FTA-1	Site FT002 consists of Fire Training Area 1, which was used for fire training exercises from 1943 to 1950. During these exercises, waste fuel, oils, and solvents were poured on frames or on the ground and burned. The site is currently an open grassy field. The contaminants detected in soil at FT002 are metals and SVOCs.
FT003	FTA-2	Site FT003 is in the northeastern portion of Travis AFB and consists of the former Fire Training Area 2. Waste fuel, oils, and solvents were burned at this site during fire training exercises from 1950 to 1962. A concrete helicopter pad covers part of the area. Contaminants detected in soil at FT003 include PAHs, metals, pesticides, PCBs, and dioxins.
FT004	FTA-3	Site FT004 covers approximately 30 acres in the northeastern portion of Travis AFB and consists of the former Fire Training Area 3. Waste fuel, oils, and solvents were burned at this site during fire training exercises from 1953 to 1962. The site is now an unused, open field. VOCs and metals have been identified as groundwater COCs. Soils at FT004 contain dioxins and metals.
FT005	FTA-4	Site FT005 covers approximately 30 acres in the southeastern portion of Travis AFB. The site includes the former Fire Training Area 4 used for fire training exercises from 1962 through approximately 1987. From 1962 until the early 1970s, waste fuels, oils, and solvents were burned at the site during training exercises. From the early 1970s until Fire Training Area 4 was closed, only waste fuels were burned. PCBs, metals, PAHs, dioxins, and pesticides have been identified in the soil at FT005. Groundwater contamination includes VOCs, SVOCs, and metals.
LF007	Landfill 2	Site LF007 is former Landfill 2 and occupies approximately 73 acres in the northeastern portion of Travis AFB. The landfill was operated in a trench-and-cover method beginning in the early 1950s through 1974. The landfill was used primarily for the disposal of general refuse, such as wood, glass, and construction debris. From the early 1950s until 1964, a portion of the eastern part of the landfill was used for storage of excess and waste materials, including oils, hydraulic fluid, and solvents for resale or disposal. Contaminants identified in soil at LF007 include PAHs, PCBs, SVOCs, and metals. Groundwater contamination includes VOCs, PCBs, dioxins, and SVOCs.
OT010	SDS	Site OT010 is in an inactive area in the southeastern portion of Travis AFB. It includes a sludge disposal site situated between Union Creek and multiple oxidation ponds. (The sludge originated from the on-base wastewater treatment plant.) Metals and pesticides have been identified in the soil at OT010.

Table II-3-1 (Cont'd)**NEWIOU Site Descriptions***North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California*

Site Name	Site Designation	Site Description
SS015	SSA and Facilities 808, 1832, and 552	<p>SS015 is in the northwestern part of the EIOU and consists of the SSA and Facilities 550 and 552. The SSA covers approximately 1.4 acres east of Facility 550 in an area previously used for stripping paint from aircraft. The site was an open grassy plot adjacent to an asphalt driveway and Facility 552. Facility 552 consisted of a fenced, bermed, concrete pad constructed in 1964 that was used as a temporary hazardous waste collection point. Stored wastes include paint, chromic acid, and solvents generated during aircraft maintenance operations at Facility 550 (Weston, 1995a). Facility 550 contained a corrosion control facility where aircraft parts and support equipment were treated and painted. A metals processing shop in Facility 550 used plating solutions containing cadmium. Facility 1832 is a 15,000-gallon OWS that received liquids generated at a wash rack on the aircraft parking apron. In 1992, a new hazardous waste accumulation facility was constructed at the site.</p> <p>In 2004, Facilities 550 and 552 were demolished to construct a POL MILCON project that consisted of an office building, a fuel truck maintenance facility, and a large concrete truck parking area.</p>
SS016	OSA Facilities 11, 13/14, 20, 42/1941, 139/144, and SSRW	<p>Site SS016 is in the central portion of Travis AFB and comprises the OSA, Facilities 11, 13/14, 20, 42/1941, 139/144, and the SSRW. The OSA covers approximately 7 acres north of Facility 16. The OSA originally encompassed an area where waste oil had reportedly been spilled or disposed of on a grassy area. The area is now paved. Oil spills, degreasing operations, leaking OWSs, equipment maintenance and repair, aircraft washing, hazardous waste storage, vehicle maintenance, storm water run-off, and a wash rack are the principal contamination sources in these areas. Chemicals handled include lubricating oils, hydraulic fluid, solvents, and water-containing solutions of these chemicals. PAHs and PCBs were identified in the soil at SS016. Groundwater contamination includes VOCs, SVOCs, and metals.</p>
WP017	OPS	<p>Site WP017 is in an inactive southeastern area of Travis AFB. Approximately 30% of the site is covered by sewage treatment plant oxidation ponds used from the 1950s to the late 1970s. Ponds along the southern base boundary were used from the late 1970s to 1990 for burial of construction materials and landscape debris. Contaminants identified in soils at WP017 include PCBs, metals, and pesticides.</p>
SS029	Monitoring Well MW329x29 Area	<p>Site SS029 consists of approximately 5.5 acres around MW329x29 in the southern part of Travis AFB, just south of the runway. PAHs, VOCs, and metals have been identified in the soil at SS029. VOCs have been identified as COCs in the groundwater at SS029.</p>
SS030	Monitoring Well MW269x30 Area	<p>Site SS030 covers approximately 1.6 acres around MW269x30, near the southern base boundary. The site is adjacent to a radar facility (Facility 1125); however, historical aerial photographs do not indicate any staining in the area or activities that may have been the source of contamination. Possible sources include a leachfield and/or surface disposal of TCE. VOCs and metals have been identified as COCs in the groundwater. Soils contain low levels of PAHs, metals, and VOCs.</p>

Table II-3-1 (Cont'd)

NEWIOU Site Descriptions

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name	Site Designation	Site Description
ST032	Monitoring Well MW107x32 and MW246x32 Areas	The MW246x32 and MW107x32 area is in the southern portion of Site ST032, also known as the Plume B area, in the central part of the EIOU. The area consists of grassy, open areas between a runway and an abandoned taxiway. Land use is severely restricted due to the proximity of the runway. MW107x32 and MW246x32 are located in the area of the SSRW. Metals, SVOCs, and VOCs were identified in soils at ST032. VOCs, metals, and fuels have been identified in the groundwater at ST032.
SD033	SS II, South Gate Area, Facilities 810 and 1917, and West Branch of Union Creek	Site SD033 includes the west branch of Union Creek, parts of SS II (previously called Storm Sewer System B), Facilities 810 and 1917, the area around the South Gate, and Outfall II. These facilities are included as one site because past activities at either of these locations have been identified as a possible contaminant source for SS II. The Air Force used these areas to handle storm water runoff, fuel transport, aircraft maintenance, and aircraft washdown, including wash racks and OWSs. Chemicals used in these areas include fuels, lubricating oil, hydraulic fluids, chlorinated solvents, and soap solutions. The Air Force constructed Facility 1917 in 1956, and the facility is no longer in use. Facility 810 was constructed in 1955 and is currently used for aircraft maintenance. VOCs, SVOCs, and metals were identified in sediment at SD033. Analyses of surface soil and surface water samples identified metals. Groundwater contamination includes VOCs and fuels.
SD034	Facility 811	Site SD034 encompasses Facility 811 and includes an indoor wash rack that is used to wash aircraft. Chemicals used at this facility include acids, solvents, antifreeze, and the Stoddard solvent PD-680. Groundwater is contaminated with VOCs, SVOCs, and fuels. Soil is contaminated with fuels.
SS035	Facility 818/819	Site SS035 contains Facilities 818 and 819 and includes a wash area, an OWS and sump, a hydraulic lift storage area, and hazardous materials accumulation area. PCBs and metals were detected in the soil at SS035. Groundwater at this site contains VOCs and fuels.
SD036	Facility 872/873/876	Site SD036 includes Facilities 872, 873, and 876. The site, while mostly paved, is surrounded by buildings and is situated in an active area of the Base. These facilities were constructed as multiple use shops, which have included a wash rack and an OWS. Current uses of the facilities include paint shops, electrical shops, landscape maintenance, paint mixing, and paint accumulation. Chemicals used include cleaning solutions, grease, degreasers, hydraulic oils and fluids, PD-680, pesticides, paints, and solvents. The Air Force constructed the shops in 1953, and they are still in use. The groundwater at this site is contaminated with VOCs and fuel. Soil is contaminated with fuels.
SD037	Sanitary Sewer System, Facilities 837/838, 919, 977, 981, Ragsdale/V Area, and Area G Ramp	SD037 contains Sanitary Sewer System Facilities 837/838, 919, 977, 981, Ragsdale/V Area, and Area G Ramp. These facilities are involved in handling domestic and industrial wastewater, aircraft maintenance, heavy equipment maintenance, air cargo, vehicle washing, fuel transport, and waste accumulation. Chemicals used and handled in these areas include wastewater, oils, hydraulic fluids, fuels, transformer fluids, and chlorinated solvents. The Air Force began operating these facilities in the 1940s and continues operations to the present day. Groundwater at SD037 contains VOCs and fuels. Contaminants identified at the site include PAHs, fuels, SVOCs, and metals.

Table II-3-1 (Cont'd)

NEWIOU Site Descriptions

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Note: Dioxins/furans exist in a number of different forms (congeners). Each of these congeners is more or less toxic than the others. To simplify reporting, all of the different congeners are converted into an equivalent amount of 2,3,7,8-TCDD using Toxicity Equivalence Factors developed by U.S. EPA, and the total amount of dioxins/furans is reported as 2,3,7,8-TCDD(eq).

COC	=	contaminant of concern
EIOU	=	East Industrial Operable Unit
FTA	=	fire training area
MILCON	=	military construction
MW	=	monitoring well
NEWIOU	=	North/East/West Industrial Operable Unit
OPS	=	oxidation pond site
OSA	=	oil spill area
OVS	=	oil/water separator
PAH	=	polycyclic aromatic hydrocarbon
PCB	=	polychlorinated biphenyls
POL	=	petroleum, oil, and lubricants
ROD	=	record of decision
SDS	=	sludge disposal site
SSA	=	solvent spill area
SS II	=	Storm Sewer II
SSRW	=	storm sewer right-of-way
SVOC	=	semivolatile organic compound
TCDD(eq)	=	tetrachlorodibenzo-p-dioxin equivalent
TCE	=	trichloroethene
U.S. EPA	=	United States Environmental Protection Agency
VOC	=	volatile organic compound

For the two sites with surface water contamination (SD001 and SD033), the surface water COPECs identified by sampling and analysis were metals. Using weight of evidence analysis, metals and pesticides were identified as surface water COPECs for SD001.

Sediment contamination was identified at Sites SD001 and SD033. The COCs/COPECs identified in sediment include VOCs, pesticides, metals, and PAHs.

Table II-3-2 summarizes the COCs/COPECs identified in soil, sediment, and surface water during the RIs. Table II-3-3 presents the COPECs identified during the EIOU RI using weight of evidence analysis. These tables are provided at the end of Section 3.2.

Table II-3-2 presents the soil COCs and COPECs at each site identified during the RIs, the maximum concentrations detected, the maximum human health risk values, and the maximum ecological risk values (HQs) associated with each contaminant, as calculated during the RIs. When reading this table, it is important to realize that it contains information derived from three different RIs, each of which used slightly different approaches to determining human health and ecological risks. In addition, the maximum contaminant concentration at a soil site does not necessarily result in the maximum potential risk posed by the contaminant. For example, a high concentration of a contaminant at the bottom of a former 6-foot trench would not result in a high ecological risk because most of the ecological receptors live in the top 4 feet of topsoil. Using the same example, a surface soil contaminant may pose the highest potential human health risk, given a higher probability for exposure, even though the highest contaminant concentration is found in the subsurface soil.

The significance of Table II-3-2 is that it lists those sites that warranted further evaluation in the FS (as described in Section 4.0). This ROD, through the Human Health Tech Memo and Eco Tech Memo, evaluated risks to human and ecological receptors using more comprehensive site data and a consistent methodology and determined whether further action was necessary at those sites (as described in Section 5.0).

3.2 Risk Assessments

As part of the RIs, an HHRA and an ERA were conducted for each site. The HHRA and ERA are summarized hereafter.

3.2.1 Human Health Risk Assessment (HHRA)

An HHRA estimates the likelihood that health problems would occur if no cleanup action were taken at a site. This “baseline risk assessment” is a four-step process:

- Step 1: Analyze Contamination
- Step 2: Estimate Exposure
- Step 3: Assess Potential Health Effects
- Step 4: Characterize Site Risk

Step 1 considers the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies are used to determine which contaminants are most likely to pose the greatest threat to human health. These are called contaminants of potential concern (COPCs).

Step 2 considers the different ways (scenarios or pathways) that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, exposure point concentrations (EPCs) are calculated.

At Step 3, the information from Step 2 is combined with information on the toxicity of each chemical to assess potential health risks. There are two types of human health effects: cancer (carcinogenic) risk and non-cancer (noncarcinogenic) hazards. The likelihood of any kind of cancer resulting from a site, called the lifetime excess cancer risk (LECR), is expressed as an upper bound probability; for example, a “1 in 10,000 chance.” In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person out of the population could get cancer than would normally be expected from all other causes. This increase is very small, considering that the background rate of cancer from all causes in the United States is approximately 1 in 2 (0.5) for men and 1 in 3 (0.33) for women. For non-cancer health effects, an HI is calculated. The key concept here is that a “threshold level” (measured usually as an HI of less than 1) exists, below which non-cancer health effects (i.e., health problems other than cancer) are no longer predicted.

Step 4 determines whether site risks are great enough to cause health problems for people at or near the site. The results of the three previous steps are combined, evaluated and summarized.

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The potential risks from the individual contaminants and pathways are added together to determine a total site risk.

The three RI reports present detailed discussions of the HHRA at NEWIOU sites. The results of the HHRA are summarized in Table II-3-2 included at the end of Section 3.2. The table provides maximum ecological risk value and maximum human health cancer risk value for each COC/COPEC. Human health non-cancer HIs are not included because there were no HIs (human health non-cancer) greater than 1 for soil, sediment, or surface water COCs in the RIs.

3.2.2 Ecological Risk Assessment

ERAs were completed for each of the three OUs. The overall purpose of an ERA is to provide a qualitative and quantitative evaluation of the actual or potential effects of contaminants on plants and animals (other than humans and domesticated species).

- The EIOU ERA evaluated potential total ecological risks to flora and fauna exposed to contaminants in the EIOU, including off-base portions of Union Creek. A two-tiered approach was used to assess the potential ecological impacts from chemicals at the Base. Tier I was a strictly model-based screening approach for assessing potential impacts. Tier II consisted of a variety of site-specific field and laboratory studies designed to improve the estimate of potential risks occurring at the site and, where appropriate, to verify the results of modeled risks (Weston, 1995b). Several areas of concern that were identified as having COPECs were given a site designation and recommended for further evaluation in the FS. The results of the EIOU ERA are summarized in Tables II-3-2 and II-3-3. The screening for COPECs is based on an HQ greater than 1. An HQ takes into account the potential exposure and toxicity of a chemical for ecological receptors, and an HQ of less than 1 indicates adverse impacts are unlikely to occur as a result of exposure to a particular chemical.
- The NOU and WIOU ERAs focused on the potential for exposure and risk from chemical contamination (i.e., chemical stressors) to terrestrial and aquatic flora and fauna that inhabit, or potentially inhabit, sites in the NOU and the WIOU at Travis AFB (Radian, 1995; Radian, 1996a). Both the NOU and the WIOU ERAs used a multi-tiered approach (JEG, 1994a), referred to as Tiers I and II. The Tier I Scoping and Qualitative Assessment (JEG, 1994b) identified ecological receptors, potentially complete exposure pathways, and sampling requirements to evaluate potential exposures. The Tier II analyses for the NOU and the WIOU were presented in their respective RI Reports (Radian, 1995; Radian, 1996a). The results of the EIOU ERA are summarized in Table II-3-2. Areas of concern that were identified as having COPECs were given a site designation and recommended for further evaluation in the FS.
- Following the completion of the OU-specific ERAs, a document entitled, *Final Comprehensive Basewide Ecological Risk Assessment - Tier 2 Screening Assessment, Travis Air Force Base, California* (CH2M HILL, 1996), designed to quantify the potential ecological risks to plants and animals on the Base using a basewide perspective, was completed.

Table II-3-2

Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs
 North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	COC/COPEC	Maximum Concentration (mg/kg)	Maximum Human Health Cancer Risk Value*	Maximum Ecological Risk Value (HQ)
NOU				
LF007 (Landfill 2 Area B)	Benzo(a)anthracene	7.73	1.8×10^{-5}	NA
	Benzo(a)pyrene	7.0	1.6×10^{-4}	NA
	Benzo(b)fluoranthene	12.6	2.9×10^{-5}	NA
	Benzo(k)fluoranthene	12.6	2.9×10^{-6}	NA
	Dibenzo(a,h)anthracene	1.02	2.4×10^{-5}	NA
	Indeno(1,2,3-cd)pyrene	1.37	3.2×10^{-6}	NA
LF007 (Landfill 2 Area D)	PCB-1260	0.986	4.0×10^{-5}	NA
	Benzo(a)pyrene	0.55	8.8×10^{-6}	NA
	Benzo(b)fluoranthene	1.12	1.2×10^{-6}	NA
	Dibenzo(a,h)anthracene	0.03	4.6×10^{-6}	NA
LF007 (Landfill 2 Area E)	PCB-1260	336	7.1×10^{-4}	NA
	Arsenic	33.4	7.2×10^{-5}	NA
LF007 (Landfill 2)	Antimony	32.5	NA	HQ >1,000
	Cadmium	11.9	NA	10 <HQ <100
	Copper	72	NA	10 <HQ <100
	Mercury	0.554	NA	1 <HQ <10
	Molybdenum	21.4	NA	100 <HQ <1,000
	Lead	343	NA	10 <HQ <100
	Silver	39.7	NA	1 <HQ <10
	Vanadium	195	NA	10 <HQ <100
	Zinc	1,200	NA	100 <HQ <1,000
	PCB-1260	336	NA	1 <HQ <10
WIOU				
SD033 (SS II)	Lead	433	NA	HQ:1-10
	Mercury	1.28	NA	HQ:1-10
	Zinc	315	NA	HQ:1-10
	(Sediment)			
	Acetone	2.5	NA	HQ:10-100
	2-Butanone	16	NA	HQ:1-100
	Carbon disulfide	0.56	NA	HQ:10-100
	Benzo(a)anthracene	3.66	NA	HQ:1-10
	Benzo(a)pyrene	4.04	NA	HQ:1-10
	Benzo(b)fluoranthene	7.7	NA	HQ:1-10
	Dibenzo(a,h)anthracene	0.362	NA	HQ:1-10
	Pyrene	4.44	NA	HQ:1-10
	Chrysene	4.34	NA	HQ:1-10
	Anthracene	2.8	NA	HQ:1-10
	Fluorene	1.19	NA	HQ:1-10
	Indeno(1,2,3-c,d)pyrene	1.22	NA	HQ:1-10
	Cadmium	13	NA	HQ:1-10
	Molybdenum	5.76	NA	HQ:1-10
	Nickel	63.6	NA	HQ:1-10

Table II-3-2 (Cont'd)

Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	COC/COPEC	Maximum Concentration (mg/kg)	Maximum Human Health Cancer Risk Value*	Maximum Ecological Risk Value (HQ)
WIOU (cont'd)	(Surface Water)			
	Barium	0.135 mg/L (dissolved)	NA	HQ:10-100
	Copper	0.0304 mg/L (dissolved)	NA	HQ:1-10
	Lead	0.248 mg/L (dissolved)	NA	HQ:1-10
		0.0596 mg/L (total)		
SD034 (Facility 811)	TPH-purgeable	15,900	> Guidance**	NA
	TPH-extractable	11,600	> Guidance**	NA
SS035 (Facility 818/819)	Molybdenum	46.4	NA	HQ:1-10
	Silver	86	NA	HQ:10-100
	Vanadium	220	NA	HQ:1-10
	Aroclor	0.523	7.9×10^{-6}	NA
SD036 (Facility 872/873/876)	TPH-purgeable	292	> Guidance**	NA
	TPH-extractable	621	> Guidance**	NA
SD037 (Facility 981)	Benzo(a)anthracene	1.68	4.3×10^{-6}	NA
	Benzo(a)pyrene	1.4	5.1×10^{-5}	NA
	Benzo(b)fluoranthene	1.3	5.4×10^{-6}	NA
	bis(2-Ethylhexyl)phthalate	0.309	1.1×10^{-7}	NA
	Benzo(k)fluoranthene	1.99	1.5×10^{-5}	NA
	Cadmium	1.53	NA	HQ:1-10
	Indeno(1,2,3-cd)pyrene	0.0227	2.8×10^{-6}	NA
	Copper	50.7	NA	HQ:1-10
	Lead	410	NA	HQ:1-10
	Mercury	0.922	NA	HQ:1-10
	Molybdenum	37.6	NA	HQ:1-10
	Zinc	362	NA	HQ:1-10
EIOU				
SD001 (Union Creek)	(Sediment)			
	Benzo(a)pyrene	25	5.5×10^{-5}	NA
	(Surface Water)			
	Aluminum	0.544 mg/L	NA	HQ >10
FT002 (FTA-1)	Lead	853	NA	HQ for metals >10
	Chromium	66.6		
	Mercury	4.62		
	Selenium	3.56		
	Silver	8.25		
	di-n-Butyl phthalate	0.71	NA	>1

Table II-3-2 (Cont'd)

Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	COC/COPEC	Maximum Concentration (mg/kg)	Maximum Human Health Cancer Risk Value*	Maximum Ecological Risk Value (HQ)
EIOU (cont'd)				
FT003 (FTA-2)	Boron	94.3	NA	HQ for metals >10
	Cadmium	10.7		
	Lead	686		
	gamma-Chlordane	0.208		
	Methoxone	17	NA	HQ for pesticides and dioxins >1
	2,3,7,8-TCDD (eq) ^a	2.1×10^{-6}		
	Benzo(k)fluoranthene	46.7	>PRG***	
	Benzo(a)anthracene	25.4	>PRG***	
	Dibenzo(a,h)anthracene	2.84	>PRG***	
	Benzo(a)pyrene	27.5	>PRG***	
	Indeno(1,2,3-c,d)pyrene	14.4	>PRG***	
FT004 (FTA-3)	Copper	2,450	NA	HQ for metals >10
	Antimony	167		
	Cadmium	6.7		
	Lead	750		
	Zinc	402		
	2,3,7,8-TCDD (eq) ^a	1.6×10^{-1}	1.4×10^{-3}	HQ >1
FT005 (FTA-4)	Barium	1,940	NA	HQ for metals >10
	Chromium	393		
	Copper	111		
	Lead	337		
	Cadmium	14.2		
	Nickel	347		
	Selenium	206		
	Zinc	353		
	Pyrene	59.9	2.0×10^{-3} for PAH and PCB	NA
	Arochlor-1254	1.09		
	Methoxone	21	NA	HQ for pesticides >1
	DDE	0.199		
	2,3,7,8-TCDD(eq) ^a	2.08****	NA	HQ >1
	Dibenzo(a,h)anthracene	0.923	>PRG***	NA
	Benzo(a)anthracene	33.3	>PRG***	NA
	Benzo(a)pyrene	34.6	>PRG***	NA
	Benzo(b)fluoranthene	55.4	>PRG***	NA
	Indeno(1,2,3-c,d)pyrene	9.36	>PRG***	NA
	Benzo(k)fluoranthene	55.4	>PRG***	NA
OT010 (SDS)	Mercury	1.77	NA	HQ for metals >10
	Silver	18.7		
	Zinc	179		
	Copper	49.7	NA	HQ >1
	DDE	0.0918		

Table II-3-2 (Cont'd)

Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	COC/COPEC	Maximum Concentration (mg/kg)	Maximum Human Health Cancer Risk Value*	Maximum Ecological Risk Value (HQ)
EIOU (cont'd)				
SS015 (Facility 552)	Molybdenum	12.3	NA	HQ for metals >10
	Antimony	21.1		
	Cadmium	22.5		
	Chromium	6,740.0		
	Copper	94.1		
	Lead	28,200.0		
	Zinc	783.0		
	Mercury	0.345		
	Silver	2.74		
	Benzo(a)anthracene	6.14	>PRG***	NA
	Benzo(a)pyrene	5.89	>PRG***	NA
	Benzo(b)fluoranthene	11.7	>PRG***	NA
	Dibenzo(a,h)anthracene	1.06	>PRG***	NA
SS016 (OSA, Facilities 11, 13/14, 20, 42/1941, and 139/144)	Arochlor-1260	0.452	8.8 x 10 ⁻³ for PAH and PCB	NA
	Fluoranthene	7.71		
	Benzo(a)pyrene	3.75		
	Benzo(b)fluoranthene	9.06		
	Dibenzo(a,h)anthracene	0.49		
WP017 (OPS)	alpha-Chlordane	0.224	NA	HQ for pesticides >1
	gamma-Chlordane	0.417		
	DDD	1.81		
	DDE	0.633		
	Aluminum	32,700		
	Cadmium	12	NA	HQ for metals >10
	Chromium	119		
	Copper	159		
	Mercury	9.16		
	Molybdenum	9.4		
	Nickel	103		
	Selenium	37.3		
	Silver	127		
	Zinc	553		
	Arochlor-1260	1.08	6.6 x 10 ⁻⁴	NA

Table II-3-2 (Cont'd)

Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	COC/COPEC	Maximum Concentration (mg/kg)	Maximum Human Health Cancer Risk Value*	Maximum Ecological Risk Value (HQ)
EIOU (cont'd)				
SS029 (MW329x29 Area)	TCE	0.123	Combined risk for all SS029 COCs = 2.0×10^{-6}	NA
	bis(2-Ethylhexyl)phthalate	0.123		
	2-Methylnaphthalene	0.149		
	Benzo(a)anthracene	0.0393		
	Benzo(a)pyrene	0.0346		
	Benzo(b)fluoranthene	0.0925		
	Benzo(k)fluoranthene	0.0925		
	Chrysene	0.0545		
	Fluoranthene	0.038		
	Indeno(1,2,3-cd)pyrene	0.0222		
	Naphthalene	0.0323		
	Pyrene	0.0383		
	Antimony	12.5		
	Beryllium	0.856		
	Cadmium	1.12		
	Cobalt	42.7		
	Copper	54.4		
	Magnesium	11,600		
	Manganese	2,400		
	Nickel	47.6		
	Zinc	109		
SS030 (MW269x30 Area)	Toluene	0.00271	Combined risk for all SS030 COCs = 6.4×10^{-5}	NA
	Xylenes	0.00425		
	1,1,1-TCA	0.00537		
	TCE	0.197		
	MEK	0.0181		
	Benzo(a)anthracene	0.0393		
	Benzo(a)pyrene	0.0498		
	Benzo(b)fluoranthene	0.0773		
	Benzo(k)fluoranthene	0.0804		
	Chrysene	0.0614		
	Fluoranthene	0.078		
	Phenanthrene	0.193		
	Pyrene	0.148		
	Benzyl butyl phthalate	0.177		
	bis(2-Ethylhexyl)phthalate	1.1		
	Antimony	37.6		
	Beryllium	0.946		
	Barium	1,350		
	Chromium	58.5		
	Copper	106		
	Lead	97.4		
	Magnesium	11,300		

Table II-3-2 (Cont'd)

Summary of Contaminants of Concern, Contaminants of Potential Ecological Concern, and Potential Risks at NEWIOU Soil, Sediment, and Surface Water Sites Identified in the RIs

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	COC/COPEC	Maximum Concentration (mg/kg)	Maximum Human Health Cancer Risk Value*	Maximum Ecological Risk Value (HQ)
EIOU (cont'd)				
SS030 (MW-269 Area) (cont'd)	Nickel	51.2	Combined risk for all SS030 COCs = 6.4×10^{-5}	NA
	Selenium	148		
	Zinc	392		
ST032 (MW107x32 and MW246x32 Areas)	Benzene	12.6	Combined risk for all ST032 COCs = 1.3×10^{-5}	NA
	1,1-DCE	0.0049		
	TCE	0.0015		
	Benzo(a)pyrene	0.034		
	Benzo(b)fluoranthene	0.0692		
	Chrysene	0.0394		
	Indeno(1,2,3-cd)pyrene	0.024		
	alpha-Chlordane	0.000356		
	Aroclor-1260	0.0292		
	Arsenic	14.9		
	Cadmium	2.57		
	Copper	66.4		
	Nickel	54.7		

Notes: COCs and COPECs are from Tables 1-2, 1-3, and 1-5 in the NEWIOU FS (Radian, 1996b). Analytical data for the EIOU, NOU, and WIOU sites are from their respective RIs.

Samples were collected from soil borings, surface samples, hand augers, and dry and wet sediment.

* Dioxins/furans exist in a number of different forms (congeners). Each of these congeners is more or less toxic than the others. To simplify reporting, all of the different congeners are converted into an equivalent amount of 2,3,7,8-TCDD using Toxicity Equivalence Factors developed by U.S. EPA, and the total amount of dioxins/furans is reported as 2,3,7,8-TCDD(eq).

* Maximum human health cancer risk is based on a residential scenario at NOU sites and an industrial scenario at WIOU and EIOU sites. Residential cancer risk was used for NOU sites because a trailer park was located on a portion of LF006 in the NOU when the RI was conducted. In the RIs, there were no hazard indices (human health non-cancer) greater than 1 for soil, sediment, or surface water COCs.

** In the WIOU RI, in the absence of ARARs, TPH concentrations were screened against values in the *Leaking Underground Fuel Tank (LUFT) Field Manual* (State of California Water Resources Control Board, 1989) as a TBC.

*** These analytes exceed U.S. EPA Region 9 Industrial PRGs (Smucker, 2000). In the EIOU RI, pyrene or fluoranthene were used to represent PAHs. The PAHs noted in human health risk value column as "> PRG" are the actual COCs to be addressed.

**** Maximum 2,3,7,8-TCDD(eq) concentration determined to be 1.4×10^{-5} mg/kg in review of EIOU contaminants.

ARAR = applicable or relevant and appropriate requirements

COC = contaminant of concern

COPEC = contaminant of potential ecological concern

DCE = dichloroethene

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethene

EIOU = East Industrial Operable Unit

FS = Feasibility Study

FTA = Fire Training Area

HQ = Hazard Quotient

MEK = methyl ethyl ketone

mg/kg = milligram per kilogram

mg/L = milligram per liter

NA = not available

NEWIOU = North/East/West Industrial Operable Unit

NOU = North Operable Unit

OPS = oxidation pond site

OSA = Oil Spill Area

PAH = polycyclic aromatic hydrocarbons

PCB = polychlorinated biphenyl

PRG = Preliminary Remediation Goal

RI = remedial investigation

ROD = record of decision

SDS = sludge disposal site

TCA = trichloroethane

TCDD(eq) = tetrachlorodibenzo-p-dioxin equivalent

TCE = trichloroethene

TPH = total petroleum hydrocarbon

U.S. EPA = United States Environmental Protection Agency

WIOU = West Industrial Operable Unit

Table II-3-3

Contaminants of Potential Ecological Concern at EIOU Soil, Sediment, and Surface Water Sites, Identified by Weight of Evidence Analysis

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Name (Designation)	Medium	Contaminant of Potential Ecological Concern
SD001	Sediment	Cadmium Lead Mercury Molybdenum Nickel Silver Zinc Benzo(a)anthracene Benzo(a)pyrene Chrysene Dibenzo(a,h)anthracene Phenanthrene Pyrene Chlordane DDD DDE Dieldrin
	Surface Water	Aluminum Selenium Silver Chlordane Dieldrin Beta endosulfan
FT003	Surface Water (vernal pool)	Aluminum

Notes:

Source of COPECs: Table 1-4 in the NEWIOU FS (Radian, 1996b).

Samples were collected from soil borings, surface samples, hand augers, and dry and wet sediment.

COPEC	= contaminant of potential ecological concern	FS	= feasibility study
DDD	= dichlorodiphenyldichloroethane	NEWIOU	= North/East/West Industrial Operable Unit
DDE	= dichlorodiphenyldichloroethene	ROD	= record of decision
EIOU	= East Industrial Operable Unit		

3.3 Site Descriptions

This section provides a description and history for each NEWIOU site. It describes the COCs and/or COPECs for surface and subsurface soil, sediment, and surface water that were identified during the RIs.

3.3.1 SD001 (Union Creek)

SD001 contains Union Creek and its associated surface water facilities that follow along the main airstrip. The site extends from Outfall IV in the north to Outfall I at the southwestern

border of the Base, including (from north to south) Outfall III and Outfall V. Travis AFB storm sewer systems discharge into Union Creek within Site SD001 at Outfalls III and IV.

The only COC in soil is the polycyclic aromatic hydrocarbon (PAH) benzo(a)pyrene. The HHRA is presented in the EIOU RI (Weston, 1995a). Contaminated soil also includes a soil pile near Union Creek at the eastern end of FT005.

Aluminum was the only COPEC identified in surface water at Union Creek by sampling and analysis in the RI (as shown on Table II-3-2). In addition to this COPEC, the EIOU ERA identified other metals and pesticides as COPECs using a weight of evidence analysis to relate toxic effects with chemicals identified at the site, instead of an HQ analysis. These other COPECs are listed in Table II-3-3.

3.3.2 FT002 (Fire Training Area 1)

FT002 consists of the Fire Training Area 1 (FTA-1), used for fire training exercises from 1943 to 1950 (Weston, 1995a). During these exercises, waste fuel, oils, and solvents were dumped onto frames or on the ground and burned. The site is now an open grassy field.

No COCs in soil were associated with human health risk at FT002. COPECs in the soil at the site are associated with ecological receptors and include lead and di-n-butyl phthalate. There are no other affected media at this site.

3.3.3 FT003 (Fire Training Area 2)

FT003 is located in the northeastern portion of the EIOU and consists of old FTA-2. The site was used for fire training exercises from 1950 to 1952 (Weston, 1995a). During these exercises, waste fuel, oils, and solvents were dumped onto frames or on the ground and burned. A concrete helicopter pad covers part of the site.

COCs found in the soil during the RI conducted at the site include PAHs, which pose a human health risk. COPECs in soil include lead, gamma chlordane, and dioxin, which pose a potential risk to ecological receptors. A comprehensive list of COCs is provided in Section 5.0. There are no other affected media at this site.

3.3.4 FT004 (Fire Training Area 3)

FT004 covers approximately 30 acres in the northeastern portion of the EIOU and consists of the old FTA-3. The site was used for fire training exercises from 1953 to 1962 (Weston, 1995a). During these exercises, waste fuel, oils, and solvents were dumped onto frames or onto the ground and burned. The site is now an unused, open field.

Dioxin is a COC at this site, and it poses a risk to human health. COPECs in soil include lead, copper, antimony, cadmium, and zinc, which pose a potential risk to ecological receptors. A comprehensive list of COCs and contaminants of ecological concern (COECs) is provided in Section 5.0. Groundwater contamination at the site includes TCE, 1,2-dichloroethane (DCA), cis-1,2-dichloroethene (DCE), chloroform, dichlorobromomethane, bis(2-ethylhexyl)phthalate, and nickel.

3.3.5 FT005 (Fire Training Area 4)

FT005 covers approximately 30 acres in the southeastern portion of the EIOU. The contaminated soil includes approximately 6.5 acres. The site includes the former Fire Training Area 4 (FTA-4), used for fire training exercises from 1962 through approximately 1987. Aerial photographs indicate that the area may have been used for munitions storage prior to 1958 (Weston, 1995a). From 1962 until the early 1970s, waste fuels, oils, and solvents were burned at the site during training exercises. From the early 1970s until FTA-4 was closed, only waste fuels were burned. An aboveground storage tank (AST) was installed in 1976 to hold the waste fuels, and it is still located at the site. The site had no berms or dikes to contain runoff, and surface runoff may have flowed into Union Creek.

COCs found during the EIOU RI (Weston, 1995a) include pyrene and aroclor-1254. COPECs include dioxins, methoxone, and metals. The COCs and COECs in surface and subsurface soils, which pose a human health risk and potential ecological risk, are presented in Section 5.0. Groundwater contamination at the site includes TCE, 1,2-DCA, cis-1,2-DCE, chloroform, dichlorobromomethane, and nickel. An interim remedial groundwater extraction system has been in operation since July 1998 (CH2M HILL, 2001).

3.3.6 LF007 (Landfill 2)

LF007 is located at old Landfill 2 and occupies approximately 73 acres in the NOU. The landfill was operated in a trench-and-cover method beginning in the early 1950s, following the closure of Landfill 1. The landfill was used primarily for the disposal of general refuse, such as wood, glass, and construction debris. Small amounts of industrial wastes and fuel sludge from tank cleaning operations also were reportedly disposed of at Landfill 2 (Radian, 1995). Use of Landfill 2 ceased in 1974. From the early 1950s until 1964, a portion of the eastern part of the landfill was used to store excess and waste materials, including oils, hydraulic fluid, and solvents, for resale or disposal. As determined by aerial photographs, a skeet range also was located at the site around 1953; however, the exact dates of operation are not known (Radian, 1995). Current operations at the site are limited to those conducted at Buildings 1360, 1365, and 1370. Building 1360 is the Affiliate Radio System; Building 1365 is used for hazardous waste storage; and Building 1370 houses the Small Arms Range. During the NOU RI (Radian, 1995), soil contamination was found in four areas of the site, referred to as Areas B, D, E, and G. COCs found in the soil at Area B include PAHs (benzo[a]pyrene). COCs found at Area D include PCBs (aroclor) and PAHs (benzo[b]fluoranthene). Area E COCs include metals and PCBs. Area G, which includes the remaining portion of Landfill 2, has metals contamination. In addition, PCBs, SVOCs, VOCs, and dioxins were found in the groundwater at the former landfill. A list of COCs identified at Landfill 2 that pose a human health risk is provided in Section 5.

As part of the WABOU Soil ROD, a Corrective Action Management Unit (CAMU) was designated and established on this site in 2002. A CAMU is a designated area within a facility that is designed to carry out a corrective action, such as the management of contaminated soil. The CAMU is an important strategy at Travis AFB for the on-base consolidation of contaminated soil. It is proposed in this ROD that NEWIOU soils be consolidated in the CAMU. Section 4.4 discusses the CAMU in more detail.

3.3.7 OT010 (Sludge Disposal Site)

OT010 is located in an inactive area in the southeastern portion of the EIOU. It consists of the sludge disposal site (SDS) situated between Union Creek and multiple oxidation ponds.

Potential human health risk is associated with PAH-contaminated soil at the site. Soil COPECs that could affect ecological receptors include mercury, zinc, silver, and copper. The pesticide dichlorodiphenyldichloroethene (DDE) also was detected. There are no other affected media at this site.

3.3.8 SS015 (Solvent Spill Area and Facilities 550 and 552)

SS015 is in the northwestern part of the EIOU and comprises the Solvent Spill Area (SSA) and Facilities 550 and 552. The SSA covers approximately 1.4 acres east of Facility 550, in an area previously used for stripping paint from aircraft. Solvent spills were reported to have occurred in the area east of Facility 550. The site was an open grassy plot adjacent to an asphalt driveway and Facility 552.

Facility 552 consisted of a fenced, bermed, concrete pad constructed in 1964 that was used as a temporary hazardous waste collection point. Stored wastes included paint, chromic acid, and solvents generated during aircraft maintenance operations at Facility 550 (Weston, 1995a).

Facility 550 contained a corrosion control facility that treated and painted aircraft parts and support equipment. A metals-processing shop in Facility 550 used plating solutions containing cadmium. Facility 1832 is a 15,000-gallon OWS that received liquids generated at a wash rack on the aircraft parking apron. In 1992, a new hazardous waste accumulation facility was constructed at the site.

In 2004, Facilities 550 and 552 were demolished to construct a POL (petroleum, oil, and lubricants) MILCON (Military Construction) project that consisted of an office building, a fuel truck maintenance facility, and a large, concrete truck-parking area. The details of this construction activity and an associated soil removal action are discussed in Section 5.3.8.

During the EIOU RI (Weston, 1995a), soil contamination that posed a potential human health risk was identified at SS015. COCs in the soil include PAHs. COPECs identified as posing a risk to ecological receptors include the metals molybdenum, antimony, cadmium, chromium, copper, lead, zinc, mercury, and silver. Additional contaminants at the site include VOCs, SVOCs, and metals in the groundwater. The interim remedial groundwater action at SS015 is monitored natural attenuation (MNA) and enhanced biodegradation.

3.3.9 SS016 (Oil Spill Area and Facilities 11, 13/14, 20, 42/1941, 139/144, and Storm Sewer Right-of-Way)

SS016 is in the center of the EIOU and comprises the Oil Spill Area (OSA) and Facilities 11, 13/14, 20, 42/1941, 139/144, and the Storm Sewer Right-of-Way (SSRW). The OSA covers approximately 7 acres north of Facility 16. The OSA originally encompassed a grassy area in which waste oil had reportedly been spilled or disposed. The area is now paved. The facilities within the site support repair of flightline service equipment, aircraft, and engines, fuel storage,

aircraft wash racks, and vehicle maintenance. A variety of solvents, hydraulic fluids, oils, fuels, and other materials are associated with these activities.

COCs found in the soil at the site during the EIOU RI (Weston, 1995a) include PAHs and PCBs. No risks to ecological receptors were identified. Groundwater COCs were identified as pre-dominantly VOCs, including TCE, DCE, and vinyl chloride. An interim remedial groundwater extraction system has been in operation since December 1997 and was enhanced by the addition of two extraction wells in 2001.

3.3.10 WP017 (Oxidation Pond Site)

WP017 is in an inactive southeastern area of the Base. It consists of the oxidation pond site (OPS). Approximately 30% of the site is covered by sewage treatment plant oxidation ponds that were in use from the 1950s to the late 1970s. The treatment plant processed domestic and industrial wastes. In the late 1970s, Base wastes were transferred to the Fairfield-Suisun Sewer District for treatment (Engineering-Science, Inc. [ESI], 1983). Ponds along the southern Base boundary were used from the late 1970s to 1990 for burial of construction materials, old tires, paint and oil containers, and landscape debris (Harding Lawson Associates, 1993).

PCBs in soil were identified as COCs during the EIOU RI (Weston, 1995a). COPECs include metals and pesticides. There are no other affected media at this site.

3.3.11 SS029 (Monitoring Well MW329x29 Area)

SS029 consists of approximately 5.5 acres around monitoring well (MW) MW329x29 in the southern part of the EIOU, just south of the runway. The monitoring well was installed to evaluate the source of the TCE plume identified at MW269x30 in SS030. Analytical results from groundwater samples collected at MW329x29 suggest that there was a contaminant source in this area (Weston, 1995a). Historical aerial photographs of the area show aircraft parked in the area; however, activity appears limited, and no source of the plume has been identified.

COCs identified in the EIOU RI (Weston, 1995a) include various VOCs, SVOCs, PAHs, and metals. No COPECs were identified as posing a risk to ecological receptors. Contaminants, such as TCE, 1,2-DCA, benzene, and vinyl chloride, were identified in the groundwater at the site during the RI. An interim remedial groundwater extraction system has been operating since November 1998 (CH2M HILL, 2001).

3.3.12 SS030 (Monitoring Well MW269x30 Area)

SS030 covers approximately 1.6 acres in the area around monitoring well MW269x30 in the southern portion of the EIOU, near the southern Base boundary. The monitoring well was originally installed to evaluate water quality along the Base boundary (Weston, 1995a). The site is adjacent to a radar facility (Facility 1125); however, historical aerial photographs do not indicate any staining in the area or activities that may have been the source of contamination.

COCs found in the soils at the site include low levels of several VOCs, SVOCs, PAHs, and metals. Lead was identified as posing a risk to ecological receptors. Additional contaminants, including, TCE, 1,2-DCA, and nickel, were identified in groundwater during the RI. An interim remedial groundwater action is in place at SS030. The SS030 on-base interceptor trench was

started in July 1998. Six off-base extraction wells were started in September 1998, and a seventh well was started in September 2000 (CH2M HILL, 2001).

3.3.13 ST032 (Areas of Monitoring Wells MW107x32 and MW246x32)

ST032 encompasses the areas around MW107x32 and MW246x32 in the central part of the EIOU. Soil contamination found during the RI includes VOCs, PAHs, pesticides, PCBs, and metals. No COPECs were identified at ST032.

COCs found in the groundwater during the RI include benzene, TCE, 1,1-DCE, xylenes, and bis(2-ethylhexyl)phthalate. Floating product identified as TPH also was found in the groundwater at the site. Passive skimmers were used to collect petroleum from the surface of the groundwater until 2004. No additional groundwater action is planned at this time (CH2M HILL, 2001).

3.3.14 SD033 (Storm Sewer II, South Gate Area, Facilities 810 and 1917, and West Branch of Union Creek)

SD033 includes the west branch of Union Creek, parts of Storm Sewer II (SS II) (previously called Storm Sewer System B), Facilities 810 and 1917, the area around the South Gate, and Outfall II. These facilities are included as one site because past activities at any of these locations have been identified as a possible contaminant source for SS II.

SS II comprises underground piping and the West Branch of Union Creek and collects runoff from within the WIOU and small portions of the EIOU and WABOU. Runoff from SS II enters Union Creek south of the WIOU at Outfall II.

Facility 810 is used for aircraft-refurbishing activities. An OWS, sump, and wash rack that used to be located at the facility and discharge to SS II have been abandoned; the facility no longer discharges to the storm sewer. Wastes generated at the facility in the past have included PD-680, paints, solvents, lubricants, PCBs, and fuels.

Facility 1917 was used as an aircraft washdown area (Radian, 1996a). An OWS and wastewater collection sumps previously used during washdown activities remain at the facility but are no longer in use. Wastes generated at the facility during past activities include PD-680, soaps, engine oil, hydraulic fluid, and jet fuel.

Contaminants detected in sediment samples during the WIOU RI that may pose a potential ecological risk include carbon disulfide, benzo(a)anthracene, and nickel. Surface soil COPECs identified in the WIOU RI include lead, mercury, and zinc. Surface water COPECs identified in the WIOU RI were barium (dissolved), copper (total), and lead. No COCs have been identified in groundwater.

3.3.15 SD034 (Facility 811)

SD034 encompasses Facility 811 in the northern portion of the WIOU on Ragsdale Street, south of Hangar Avenue. Approximately 75% of the area is covered with roadbase and asphalt. Facility 811 includes an indoor wash rack that is used to wash aircraft. Wastewater from the wash rack flows into an OWS. Flow from the OWS can be directed into either the sanitary sewer

or a concrete-lined overflow pond just west of the facility. A hole was discovered in the OWS during 1994; the OWS has since been removed and replaced.

COCs detected in the soil during the RI include TPH. COCs in groundwater include VOCs, such as TCE and cis-1,2-DCE. An interim remedial groundwater extraction system has been in operation since February 2000, when the West Treatment and Transfer Plant (WTTP) was brought on line.

3.3.16 SS035 (Facility 818/819)

SS035 contains Facilities 818 and 819 and includes a wash area, an OWS and sump, a hydraulic-lift storage area, and a hazardous materials accumulation area. Asphalt and roadbase cover most of this site, though there is some exposed soil and grass along the eastern end of Facility 818.

COCs in the site soil identified in the WIOU RI include PCBs. The metals molybdenum, silver, and vanadium were identified as COPECs in soil. Other COCs were TCE and TPH-gasoline in the groundwater. A contaminant source could not be determined for the PCBs.

3.3.17 SD036 (Facility 872/873/876)

SD036, in the southeastern end of the WIOU, includes Facilities 872, 873, and 876. The site, while mostly paved, is surrounded by buildings and is situated in an active area of the Base. These facilities were constructed in 1953 as multiple-use shops; they have included a wash rack and an OWS. Current uses of the facilities include paint shops, electrical shops, landscape maintenance, paint mixing, and paint accumulation. The West Branch of Union Creek borders the eastern side of the site.

Contamination in the soil detected during the RI includes TPH. Groundwater COCs include VOCs (such as TCE, vinyl chloride, and TPH). An interim remedial groundwater extraction system has been in operation since February 2000, when the WTTP was brought on line.

3.3.18 SD037 (Sanitary Sewer System, Facilities 837/838, 919, 977, 981, Ragsdale/V Area, and Area G Ramp in the WIOU)

SD037 encompasses a large portion of the sanitary sewer system, Facilities 837/838, 919, 977, and 981, the Ragsdale/V area, and the Area G Ramp in the WIOU. Operations at the facilities have included an OWS, sumps, wash racks, and a fuel-hydrant system.

COCs found in the subsurface soils include TPH and SVOCs. Metals and PAHs were identified at isolated locations in the surface soil. COPECs identified as posing a potential risk to ecological receptors include copper, lead, mercury, molybdenum, zinc, and cadmium. The primary contaminant in the groundwater is TCE. Other contaminants in groundwater include petroleum hydrocarbons, PAHs, and other chlorinated hydrocarbons. An interim remedial groundwater extraction system has been in operation since February 2000, when the WTTP was brought on line.

3.4 Description of RI No Further Action Sites

This section provides a description and history for NEWIOU sites investigated in the RI phase and for which a determination of NFA (No Further Action) was made at the conclusion of each of the three RIs. It also identifies the potential contaminants investigated, the investigation results, and the rationale for the NFA determination.

3.4.1 NFA Sites Determined in the NOU RI

3.4.1.1 Former Skeet Range

A 1953 Civil Engineering drawing of the base showed a skeet range located in the southern portion of Landfill 2. The potential contaminant was lead from lead shot. Surface soil samples were taken in the area. Evaluation of the data showed that the area was not a source area of inorganic constituents (including lead) and that levels of inorganics in the soil were consistent with background. The RI recommended no further action on the skeet range as an individual Area of Concern (AOC). The former skeet range and two other AOCs were combined and designated LF007 after the RI. The NFA determination is documented in the Final NOU RI (Radian, 1995).

3.4.1.2 Landfill 1 (LF006)

Landfill 1 was a burn-and-fill landfill operated from 1943 to 1950 that covered approximately 17 acres in the western portion of the NOU. Materials disposed of and burned consisted primarily of general refuse, such as wood, glass and construction debris, although some disposal of industrial wastes was reported. The potential contaminants were VOCs, SVOCs, metals, PCBs, pesticides, dioxins, and petroleum hydrocarbons. Groundwater, soil gas, surface flux, surface water, sediment, surface soil, and subsurface soil samples were taken in the area. The NOU RI evaluated the data and performed a risk assessment. The RI concluded that the soil at Landfill 1 did not indicate an unacceptable risk and recommended no further action. The RI recommended that the groundwater at Landfill 1 be evaluated further in the FS due to TCE concentrations. Landfill 1 was designated as LF006 after the RI and addressed in the NEWIOU FS, Proposed Plan, and Groundwater IROD as a groundwater-only site. The NFA determination for soil is documented in the Final NOU RI (Radian, 1995).

3.4.2 NFA Sites Determined in the EIOU RI

3.4.2.1 Grid 216 I Site

Grid 216 I refers to a specific area, within the base map grid system, that is located on the southern side of the runway, where a C-124 plane crash was reported to have occurred in 1956. The site is covered with grass. An aerial photograph review did not reveal any staining or any other evidence of a crash. The primary concern at the site was the potential for petroleum-related contamination caused by the plane crash. A 500-foot long area along the runway was investigated.

Groundwater samples were taken in the area, and the only detection was TCE at 1.1 micrograms per liter ($\mu\text{g/L}$). The site investigation concluded that there are no contaminants associated with the plane crash location, and that the low level of TCE is associated with the nearby

MW-329 site (ERP Site SS029); an NFA was recommended. The NFA determination is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.2 Facility 336

Facility 336 was a pesticide shop that was constructed in 1951 and demolished in 1990. The potential contaminants were VOCs, SVOCs, and petroleum hydrocarbons. Data were collected from surface soil and subsurface soil. The RI determined that concentrations of pesticides detected in the soil at Facility 336 were similar to concentrations detected at other EIOU sites and were considered to be the result of agricultural use prior to the establishment of Travis AFB. The levels of contaminants did not indicate an unacceptable risk, and NFA was recommended. The NFA determination is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.3 Facility 1185

Facility 1185 was constructed in 1963 and contains the radar and weather antenna facility. A small fuel spill was reported to have occurred inside the building. The potential contaminants were VOCs, pesticides, metals, and petroleum hydrocarbons. Data were collected from surface soil and subsurface soil. TPH was detected in surface and subsurface soil samples, with a maximum of 120 milligrams per kilogram (mg/kg). Pesticide concentrations detected in the soil were similar to concentrations detected at other EIOU sites and considered to be the result of agricultural use, prior to the establishment of Travis AFB, or from adjacent agricultural property. The RI determined that the low concentrations of TPH detected in surface soil resulted from surface runoff from the road and parking lot. The levels of contaminants did not indicate an unacceptable risk, and NFA was recommended. The NFA determination is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.4 Facility 1201

Facility 1201 contains the flight kitchen, aircraft toilet maintenance shop, and flight service shop. The potential contaminants were VOCs, SVOCs, metals, and petroleum hydrocarbons. Data were collected from surface soil and subsurface soil. TPH was detected at all surface soil and soil boring locations at Facility 1201, but no source of contaminants was identified at the site.

The RI concluded that the contamination was associated with the nearby Facility 363, which is a fuel storage area with aboveground and underground tanks. The RI stated that the TPH at the site is likely the result of leaking tanks. Facility 363 has become ERP site ST028 and is being addressed as a non-CERCLA site under the ERP POCOS program. The NFA determination for Facility 1201 is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.5 Facility 206

Facility 206 was constructed in 1973 as the Aeromedical Evacuation Training area. Contamination at Facility 206 is associated with two USTs located at the facility. The potential contaminants were VOCs, metals, and petroleum hydrocarbons. Data were collected from surface soil and subsurface soil. The maximum TPH concentration detected in the soil was 72 mg/kg, which was below guidance values. VOCs detected in soil were common laboratory contaminants and were not detected in underlying groundwater. The levels of contaminants did not indicate an

unacceptable risk, and NFA was recommended. The NFA determination is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.6 Facility 226

Facility 226 was the auto/photography hobby shop constructed in 1966. A visual site inspection in 1992 indicated evidence of leakage from the waste oil tank, as observed in a stained area. A waste oil trench collection system and associated UST were removed from the site during the UST removal program in 1994. The potential contaminants were VOCs, metals, and petroleum hydrocarbons. Data were collected from surface soil and subsurface soil. The maximum TPH concentration detected in the soil was 62 mg/kg, which was below guidance values. VOCs detected in soil were common laboratory contaminants and were not detected in underlying groundwater. The levels of contaminants did not indicate an unacceptable risk, and NFA was recommended. The NFA determination is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.7 Facility 381

Facility 381 is the Old Base Hospital. No source area has been identified at the site, although fixer and developer were disposed of at the sanitary sewer at the site. Thirty soil gas samples were collected from the site in 1993 and did not reveal any detection of organics. The RI recommended NFA for this area because the soil gas survey did not detect contaminants in the soil. The NFA determination is documented in the Final EIOU RI (Weston, 1995a).

3.4.2.8 Facility 1205 (SD031)

Building 1205 is a diesel generator maintenance and repair facility located in the northeastern part of the EIOU. It was constructed in 1957 and includes a wash rack and OWS. The facility has handled oils, antifreeze, and solvents since 1957. The potential contaminants were VOCs, SVOCs, pesticides, PCBs, petroleum hydrocarbons, and metals. Groundwater, surface soil, and subsurface soil samples were taken in the area.

The EIOU RI evaluated the data and performed a risk assessment. The RI determined that groundwater contamination (primarily TCE) was a potential human health risk and recommended further evaluation in the FS. The detected concentrations indicated that dense nonaqueous phase liquid (DNAPL) may be present in the area. Facility 1205 was designated SD031 in the RI and has been addressed in the NEWIOU FS, Proposed Plan, and Groundwater IROD as a groundwater site (including any potential DNAPL). The RI concluded that the levels of contaminants in the soil at Facility 1205 did not indicate an unacceptable risk, and NFA was recommended. NFA for the soil (vadose zone) portion of SD031 is documented in the Final EIOU RI (Weston, 1995a).

3.4.3 NFA Sites Determined in the WIOU RI

3.4.3.1 Facility 835

Facility 835 is located east of Ragsdale Street in the central portion of the WIOU. The building was constructed in 1954 as an aircraft maintenance shop and is currently used as an office building. A sump east of the facility and a transformer on the western side of the facility were investigated as areas where contamination may have been released to the environment. The

potential contaminants for the sump were VOCs, SVOCs, and petroleum hydrocarbons. The potential contaminant for the transformer pad was PCBs.

Data collected from soil borings, a surface scrape, soil gas samples, and HydroPunch® ground-water samples were of sufficient quantity and quality to determine that no contaminants were released from the sump and transformer at Facility 835, and NFA was recommended. The NFA determination is documented in the Final WIOU RI (Radian, 1996a).

3.4.3.2 Facility 839

Facility 839 is an aircraft hangar located east of Ragsdale Street. It was constructed in 1958 to house TF33 engine inspection, cleaning, and maintenance operations. During these activities, the engines were hung on racks above drip pans, which contain small leaks and spills of oils and solvents. Facility 839 also houses a large degreasing tank. The potential contaminants were VOCs, SVOCs, petroleum hydrocarbons, and metals.

Data collected from soil, soil gas, and groundwater samples were of sufficient quantity and quality to determine that the waste accumulation area at Facility 839 was not a source of contaminants, and NFA was recommended. The NFA determination is documented in the Final WIOU RI (Radian, 1996a).

3.4.3.3 Facility 842

Facility 842 is located east of Ragsdale Street and was constructed as an aircraft hangar in 1958; it is now used as a parts warehouse. A hazardous waste accumulation point that previously serviced several nearby facilities was located east of Facility 842 on the flightline apron. The area was used to store reclaimed jet fuel, hydraulic fluid, batteries, and used engine oil in 55-gallon drums. The potential contaminants were petroleum hydrocarbons, VOCs, SVOCs, and metals.

Data collected from soil, soil gas, and groundwater samples were of sufficient quantity and quality to determine that the waste accumulation area at Facility 842 was not a source of contaminants. The NFA determination is documented in the Final WIOU RI (Radian, 1996a).

3.4.3.4 Facility 871

Facility 871 is located southwest of the Ragsdale Street and V Street intersection. Facility 871 was constructed in 1953 to serve as a civil engineering storage and waste accumulation area for Facilities 872, 873, 874, and 878. From 1965 to 1983, the facility was used to store and mix pesticides, and it has recently been used to store oil and distillate materials used at Facility 872. There is also a hazardous waste accumulation area on the southern side of the facility and a drum storage area approximately 75 feet east of the facility. The potential contaminants were VOCs, SVOCs, metals, PCBs, pesticides, and petroleum hydrocarbons.

Data collected from soil, soil gas, and groundwater samples were of sufficient quantity and quality to determine that the drum storage area and the former pesticide storage area at Facility 871 were not sources of contamination. TCE, tetrachloroethene (PCE), and TPH in groundwater are attributed to a source at Facility 872, which is part of ERP Site SD036. The NFA determination is documented in the Final WIOU RI (Radian, 1996a).

4.0 NEWIOU Feasibility Study Summary

Travis AFB conducted an FS for the sites within the NEWIOU to assist in selecting RAs for the contaminated soil, sediment, and surface water (Radian, 1996b). The primary objectives of the FS were to:

- Identify potential response actions, technologies, and process options to address the potential risks in the NEWIOU;
- Screen the technologies and process options;
- Assemble feasible and appropriate remedial alternatives;
- Provide detailed evaluations of the remedial alternatives; and
- Perform a comparative analysis of the alternatives.

The FS was divided into three main phases:

- The Initial Screening of Alternatives;
- The Detailed Analysis of Alternatives; and
- The Comparative Analysis of Alternatives.

The discussion of the FS in this section of the ROD is from a historical perspective. As discussed in Section 2.2.3, after the NEWIOU SSSW Proposed Plan was completed, there was a four-year delay while the WABOU Soil ROD was completed. Work then began on the NEWIOU SSSW ROD using the approach that proved successful for the WABOU Soil ROD. One of the changes was the use of PRGs as the basis for soil cleanup levels for human health, as discussed in Section 5.2.3, unless a lower or higher level was justified. In addition, due to delay and the complexity of dealing with 18 sites, 40 COCs, 3 media (soil, sediment, and surface water), and 3 types of receptors (human, ecological, and groundwater) in one document, it was decided to use tech memos as ROD development documents. The three tech memos (Human Health Tech Memo, Eco Tech Memo, and Groundwater Protection Tech Memo) provided site-by-site summaries and maps with RI data and any updated site information. The Eco Tech Memo provided an extensive update of the ERA. After extensive discussion between the Air Force and the regulatory agencies, selected remedial alternatives were included in each tech memo for each site, with supporting rationale. The information from the three tech memos was summarized and consolidated in this ROD. The intent was to have this ROD provide the decisions on remedial actions and how they were developed, yet still be concise (approximately 1 inch thick). The details of the ROD development are available in the tech memos (totaling approximately 5 inches thick) if needed. Sections 5.2.3, 5.2.4, and 5.2.5 discuss each of the tech memos in more detail.

The tech memos built upon the NOU, EIOU, and WIOU RIs, the NEWIOU FS, and the NEWIOU SSSW Proposed Plan, but at some sites the remedial alternative selected in this ROD differed from the NEWIOU SSSW Proposed Plan. All remedial alternatives selected in this ROD

were included and discussed in the NEWIOU SSSW Proposed Plan. The Responsiveness Summary (Part III) of this ROD documents the presentation of the differences between the NEWIOU SSSW Proposed Plan and this ROD to the public and their response.

4.1 Initial Screening of Alternatives

The purpose of the Initial Screening of Alternatives (ISA) is to develop an appropriate range of remedial alternatives that would protect human health and the environment at the 18 sites identified in the RIs. This is necessary because of the large number of remedial technologies available to handle a wide variety of contaminants under various site conditions.

With all of the combinations of remedial options available, the evaluation process could easily become too complicated and cumbersome. To prevent this, during the ISA those technologies that were not appropriate for the contaminants and site conditions found in the NEWIOU were screened out. The remaining technologies were used to develop the most promising remedial alternatives.

The alternatives screening process consists of the following seven steps.

Step 1: Establish Remedial Action Objectives. Remedial action objectives (RAOs) specify the extent of cleanup required to protect human health and the environment. The RAO for a site takes into account the contaminant that poses the potential risk, the exposure routes and receptors, and an acceptable contaminant level or range of levels for each exposure route.

Step 2: Develop General Response Actions. General response actions describe the broad range of actions that will satisfy the RAOs.

Step 3: Identify Potential Remedial Technologies and Process Options. Many potentially applicable technology types are available to remediate all categories of contaminants under various site conditions. Some technologies have a proven record of performance; others are promising but have not been tested under all field conditions. General technology types that can be used to implement a general response action are referred to as remedial technologies. Specific technology types within a remedial technology are called process options. An example of a remedial technology for an administrative action is access restrictions; an example of a process option within this remedial technology is fencing. Information on remedial technologies and process options is acquired through database searches and technical journal reviews. This review of all potentially applicable technologies ensures that the best technologies are not overlooked early in the FS process.

Step 4: Screen Process Options for Technical Implementability. In this step, the list of technology and process options is reduced by evaluating the technical implementability of the options. Technical implementability refers to the ability of the remedial technology or process option to meet an RAO. The result of this step is a list of technologies and process options that are capable of addressing contaminant types found in the NEWIOU under existing site conditions.

Step 5: Evaluate Technology and Select Representative Process Options. The process options that survived the Step 4 screening are evaluated for administrative implementability, effective-

ness, and cost. Examples of administrative implementability are the ability to obtain the necessary permits and the availability of necessary equipment and workers to implement the process option. This evaluation further reduces the list of process options to those that can be implemented, that are effective in treating the contaminants in the NEWIOU, and that are not cost-prohibitive.

Even after the above evaluations are completed, a number of process options could be implemented to meet the RAOs. From the list of remaining process options within each remedial technology, a representative process option is selected. The representative process option is used to develop the alternatives, but the other equally promising process options are retained.

Step 6: Assemble Remedial Alternatives. The representative process options are used to assemble remedial alternatives that represent a range of general response actions specifically for the NEWIOU sites.

Step 7: Screen Remedial Alternatives. In this final step of the ISA, the remedial alternatives are again screened to ensure they meet three criteria: protectiveness of human health and the environment, implementability, and cost-effectiveness.

The six alternatives identified in the ISA that are applicable to the two NEWIOU sites with surface water contamination (i.e., SD001 and SD033) were:

- Alternative #10: No Action;
- Alternative #11: Institutional Actions;
- Alternative #12: Collection Sump, Ion Exchange, Activated Carbon, Discharge to Union Creek;
- Alternative #13: Collection Sump, Activated Carbon, Discharge to Union Creek;
- Alternative #14: Slip-Lining and Collaring Storm Sewer System; and
- Alternative #15: Source Control.

The seven alternatives identified in the ISA that are applicable to the NEWIOU sites with soil and/or sediment contamination were:

- Alternative #16: No Action;
- Alternative #17: Institutional Actions (Land Use Controls, Access Restrictions)/Natural Attenuation
- Alternative #18: Backhoe, Disposal at Existing Off-Site Landfill;
- Alternative #19: Soil and Bentonite Cap;
- Alternative #20: Backhoe, Ex Situ High Temperature Thermal Treatment, Disposal at Existing Off-Site Landfill;

- Alternative #21: In Situ Soil Vapor Extraction (SVE), Off Gas Catalytic Oxidation; and
- Alternative #22: In Situ Bioventing.

Alternatives #1 through #9 identified options to address groundwater contamination at the NEWIOU sites. These alternatives are not shown here because this ROD does not address groundwater contamination.

4.2 Detailed Analysis of Alternatives

The purpose of the Detailed Analysis of Alternatives (DAA) is to analyze the alternatives identified in the ISA and present the relevant information needed to select the appropriate remedies. This is accomplished by evaluating each alternative against the nine criteria provided under CERCLA. Table II-4-1 identifies and defines the nine evaluation criteria used in the FS. The Community Acceptance and State Acceptance criteria are addressed in this NEWIOU SSSW ROD on the basis of acceptance of the NEWIOU SSSW Proposed Plan and the evaluation of comments received during the 8 July 1998 to 8 August 1998 public comment period.

The 13 alternatives selected in the ISA were next evaluated according to criteria specified in CERCLA. Conducting such an evaluation is difficult at an area as large and complex as the NEWIOU. Analyzing 20 sites by 22 alternatives (including groundwater sites and alternatives) would result in over 200 detailed analyses, which would be both repetitive and obtuse. Consequently, the FS took two steps to reduce this complexity. First, the 20 sites were combined into 18 groups (9 groundwater, 8 soil/sediment, 1 surface water). The groups were formed on the basis of each site's location, contaminant type, and environmental medium—so, a site with both soil and groundwater contamination could be placed in two groups. Second, a representative site was then chosen from each group. This representative site was then ranked according to the CERCLA criteria. This approach eliminated repetition without compromising the conclusions of the DAA.

The key elements and results of the FS have been summarized in a series of tables and figures:

- The 18 sites, their names, and the media impacted (Table II-4-2); and
- The 18 site groupings (Groups J through R) and the rationale for each group (Table II-4-3).

Although site groupings were useful in the FS, the NEWIOU SSSW Proposed Plan and this ROD evaluate sites individually.

4.3 Comparative Analysis of Alternatives

In the final phase of the FS, the soil and sediment remediation alternatives are evaluated in accordance with the requirements of each CERCLA criterion. This evaluation identifies the relative strengths and weaknesses of each alternative to determine the preferred alternatives at each site. Each remedial alternative was evaluated against the criteria specified in CERCLA (as summarized on Table II-4-1). The criteria attempt to answer such questions as: How effective is the alternative? Is it easily implemented? What is the probable cost? Will it be in compliance with all applicable regulations? Each remedial alternative was given a rating of 0, 3, or 5 (0 does

Table II-4-1

Remedial Alternative Evaluation Criteria

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Criterion Type	Evaluation Criterion	Definition
Threshold Factors	Protective of human health and the environment ^a	Protects human health and the environment through the elimination, reduction, or control of contaminated media. All migration pathways must be addressed.
	Compliance with appropriate ARARs ^a	Addresses whether a remedy will meet all ARARs (federal and state environmental requirements) and/or provide grounds for invoking a waiver.
Balancing Factors	Long-term effectiveness and permanence ^a	Protects human health and the environment after the remedial objectives have been met.
	Reduction in toxicity, mobility, and volume through treatment ^a	Treats the media and reduces the toxicity, mobility, and/or volume of the contaminated media.
	Short-term effectiveness ^a	Protects human health and the environment during construction and implementation. The degree of threat and the time period to achieve remedial action objectives also are considered.
	Implementability	There are no administrative barriers (no permits, zoning limitations). The availability of materials and personnel, site features, such as available space and topography, and impacts on ongoing operations are considered. The technical status of alternatives also is considered; theoretical technologies with only limited bench-scale evaluation are considered less implementable than fully proven processes.
	Cost	Costs include design, construction, startup, monitoring, and maintenance. Accuracy is to within -30% and +50%.
Modifying Considerations	State acceptance	The state's (or other regulatory agency's) preference among or concern about alternatives.
	Community acceptance	The community's apparent preferences among or concerns about alternatives.

^a Effectiveness criterion used to determine the benefit/cost ratio.

ARARs = applicable or relevant and appropriate requirements

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

not meet the criterion, 3 partially meets the criterion, 5 completely meets the criterion). For example, take the CERCLA criterion "Reduction in Toxicity, Mobility, and Volume Through Treatment." An alternative would be rated 5 if it eliminated the problem, 3 if it only reduced the problem, and 0 if it would have no effect.

One criterion, cost, is different from the other six CERCLA criteria (included under Threshold Factors and Balancing Factors) evaluated during the FS. Alone, these other criteria cannot determine the "best" alternative. Cost adds an important quantitative element because funding is often a limiting factor in selecting an alternative. As such, cost was evaluated differently,

Table II-4-2

NEWIOU Soil, Sediment, and Surface Water Sites

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site ERP Designation	Site Name	Operable Unit	Affected Media
SD001	Union Creek	EIOU	Soil*, Surface Water
FT002	FTA-1	EIOU	Soil
FT003	FTA-2	EIOU	Soil
FT004	FTA-3	EIOU	Soil, Groundwater
FT005	FTA-4	EIOU	Soil, Groundwater
LF007	Landfill 2	NOU	Soil, Groundwater
OT010	Sludge Disposal Site	EIOU	Soil
SS015	Solvent Spill Area and Facilities 808, 1832, and 552	EIOU	Soil, Groundwater
SS016	Oil Spill Area Facilities 11, 13/14, 20, 42/1941, 139/144, and Sewer System Right-of-Way	EIOU	Soil, Groundwater
WP017	Oxidation Pond Site	EIOU	Soil
SS029	MW329x29 Area	EIOU	Soil, Groundwater
SS030	MW269x30 Area	EIOU	Soil, Groundwater
ST032	MW246x32/MW107x32 Areas	EIOU	Soil, Groundwater
SD033	Storm Sewer II, South Gate Area, Facilities 810 and 1917, and West Branch of Union Creek		Soil*, Surface Water, Groundwater
SD034	Facility 811	WIOU	Soil, Groundwater
SS035	Facility 818/819	WIOU	Soil, Groundwater
SD036	Facility 872/873/876	WIOU	Soil, Groundwater
SD037	Sanitary Sewer System, Facilities 837/838, 919, 977, 981, Ragsdale/V Area, and Area G Ramp	WIOU	Soil, Groundwater

* Soil includes sediment.

EIOU	=	East Industrial Operable Unit	NOU	=	North Operable Unit
ERP	=	Environmental Restoration Program	ROD	=	record of decision
FTA	=	Fire Training Area	WIOU	=	West Industrial Operable Unit
NEWIOU	=	North/East/West Industrial Operable Unit			

using ratings of 5, 3, 1, and -1. Remedial alternatives with costs ranging from less than \$1.5 million were awarded a score of 5, and costs over \$10 million were awarded a score of -1.

Once all of the alternatives were scored (or rated) for each of the seven criteria, two methods were used to compare the results. One method was to compare the "Total Score" (or the sum of ratings awarded for each of the seven CERCLA criteria) of each remedial alternative. The other method is the "Benefit/Cost Ratio," in which the sum of the scores for the first five criteria (i.e., the seven criteria under Threshold Factors and Balancing Factors, excluding implementability and cost) is divided by the estimated cost of the alternative in millions of dollars. Hence, an alternative costing \$6.4 million dollars can have a total score of 29, and a benefit/cost ratio of

Table II-4-3

Site Groupings

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Media	Group	Sites ^a	Rationale for Grouping
Surface water	J	SD033 , SD001	<ul style="list-style-type: none"> Both surface water sites impact Union Creek. Surface water COCs (TCE, TPH, and metals) are similar for both sites. Groundwater source control or downstream treatment could be used for both sites.
Soil	K	FT003 , FT002, FT004, FT005	<ul style="list-style-type: none"> Similar COCs (PCBs, PAHs, and dioxins/furans). Includes all former fire-training areas in the NEWIOU.
Soil	L	LF007	<ul style="list-style-type: none"> Geographically isolated location in northeastern corner of Travis AFB. Subject to remediation to mitigate ecological risk. COCs (PCBs, PAHs, and metals) derived from landfill operations. Unique heterogeneous nature of subsurface soil.
Soil	M	WP017 , OT010, SS029, SS030	<ul style="list-style-type: none"> Sites located close together southeast of the runway. Similar COCs (PAHs and metals). Soil volumes are similar for both sites.
Soil	N	SS035 , SS015, SS016	<ul style="list-style-type: none"> Similar COCs (PAHs). Sites located close to each other near center of Travis AFB.
Soil	O	SD036	<ul style="list-style-type: none"> Soil gas COCs (TPH, chlorinated organics) are a primary concern. Major soil contaminant is TPH.
Soil	P	SD037 , SD033	<ul style="list-style-type: none"> Much of contamination is associated with storm and sanitary sewers. Contains isolated pockets of soil gas (contaminated with TPH, benzene, and TCE). Site contains PAHs in surface soils and TPH and SVOCs in subsurface soils.
Soil	Q	SD034 , ST032	<ul style="list-style-type: none"> Free product above water table. Major soil contaminant is TPH. Soil gas contaminated with TPH and TCE.
Soil ^b	R	SD001 , SD033	<ul style="list-style-type: none"> Sediments associated with surface water are media of concern, rather than soils. Similar COCs (metals and PAHs).

^a The representative site for each group is listed first and bolded.^b Soil includes sediment.

COC = contaminant of concern

NEWIOU = North/East/West Industrial Operable Unit

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyls

ROD = record of decision

SVOC = semivolatile organic compound

TCE = trichloroethene

TPH = total petroleum hydrocarbons

3.9 (the sum of the first five criteria is 25; 25 divided by 6.4 equals 3.9). In effect, the total score measures overall compliance with the CERCLA criteria. The benefit/cost ratio (also termed “cost effectiveness”) better quantifies the degree to which the criteria are satisfied per unit cost expenditure. “Effectiveness” is the sum of the first five criteria. It should also be noted that this analysis was performed several years ago in the FS and would not be identical to an analysis performed in an FS today.

Employing the methods described above, Figures II-4-1 and II-4-2 summarize the alternatives receiving the highest scores and ratios for surface water and for soil (and sediment, if present), respectively. It should be noted that the highest ranking (score) does not necessarily result in the “best” alternative, considering the assumptions used in the analysis.

The NEWIOU FS only evaluated the feasible remedial alternatives for each group. It stopped short of identifying the preferred alternative, which was the responsibility of the Proposed Plan and ROD. The selected remedial alternatives for each site are described in Section 5.0. The following subsections provide discussions of how alternatives were determined to meet CERCLA criteria in the FS analysis.

4.3.1 Summary of the Surface Water Group

For the surface water group (Group J), Alternative 15 (Source Control) had the highest total score, and Alternative 14 (Slip-Lining and Collaring Storm Sewer System) was the most cost effective. Travis AFB has implemented source control (using groundwater extraction and treatment) as part of the WABOU and NEWIOU Groundwater IRODs to control migration of contaminated groundwater to Union Creek. Recent sampling has shown that extraction of groundwater has reduced the levels of TCE in the creek to levels that do not pose a risk to human health or the environment.

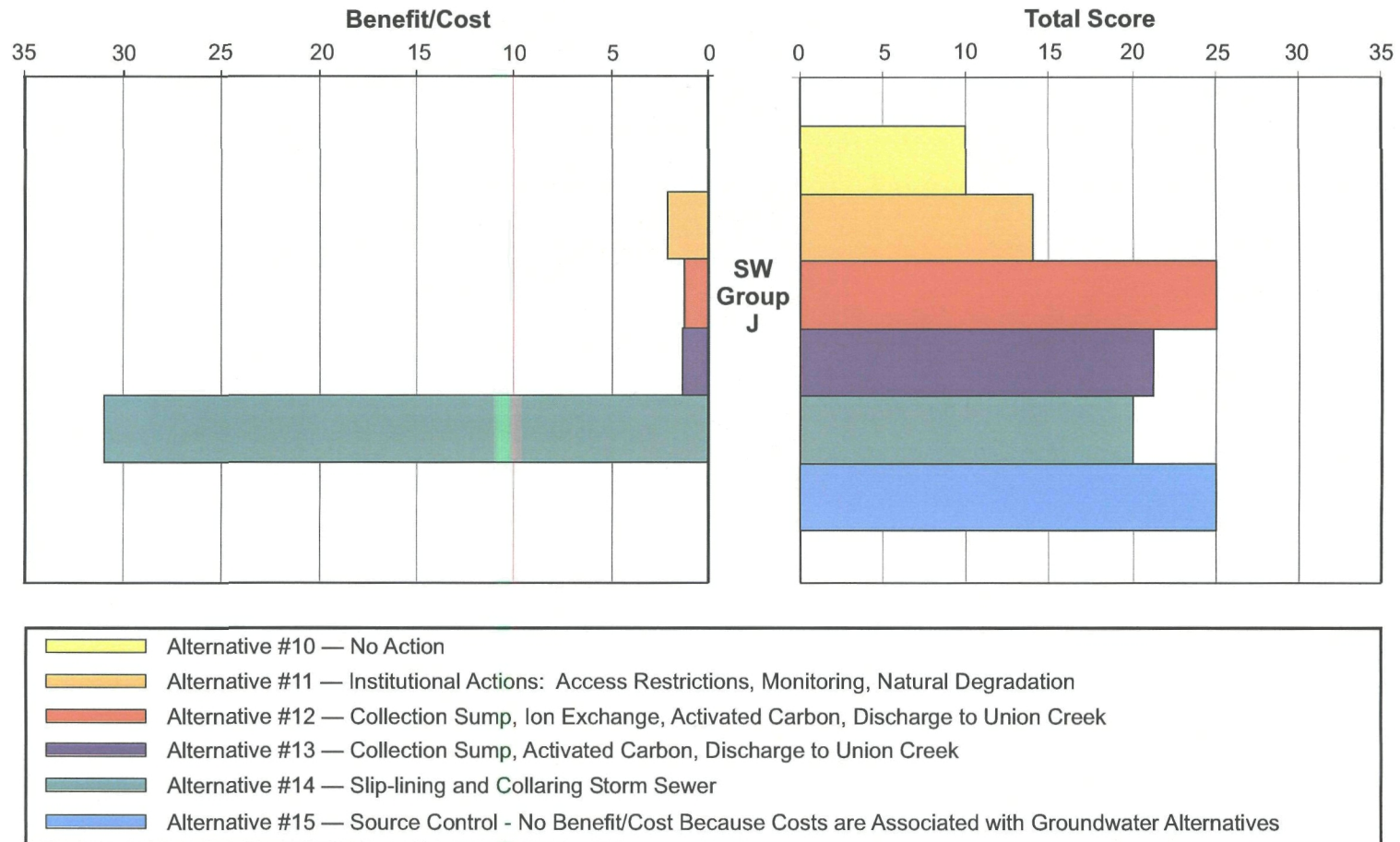
Table II-4-4 contains the total scores, present worth costs, and benefit/cost ratios for each surface water alternative. The NEWIOU FS presents the detail on how these scores, costs, and ratios were calculated. As previously indicated, Figure II-4-1 shows a bar chart comparing the surface water alternatives' total scores and benefit/cost ratios.

4.3.2 Summary of the Soil Groups

For all soil groups, except Group O, Alternative 20 (Excavation and Off-Site Thermal Treatment and Disposal) was rated the most effective. For Group O, Alternatives 21 (SVE and Catalytic Oxidation Treatment) and 22 (Bioventing) were rated equally effective. Among the seven groups for which Alternative 20 was the most effective, cost-effectiveness was again a distinguishing factor. For Groups K, L, M, N, O, P, and Q, Alternative 17 (Institutional Actions) was rated the most cost effective. For Group R, Alternative 18 (Excavation, Removal to Landfill) was rated the most cost effective.

Tables II-4-5, II-4-6, and II-4-7 contain a summary of the results of the evaluations for soil groups. The NEWIOU FS presents the detail on how these scores, costs, and ratios were calculated. As previously indicated, Figure II-4-2 shows the soil alternatives' total scores and benefit/cost ratios.

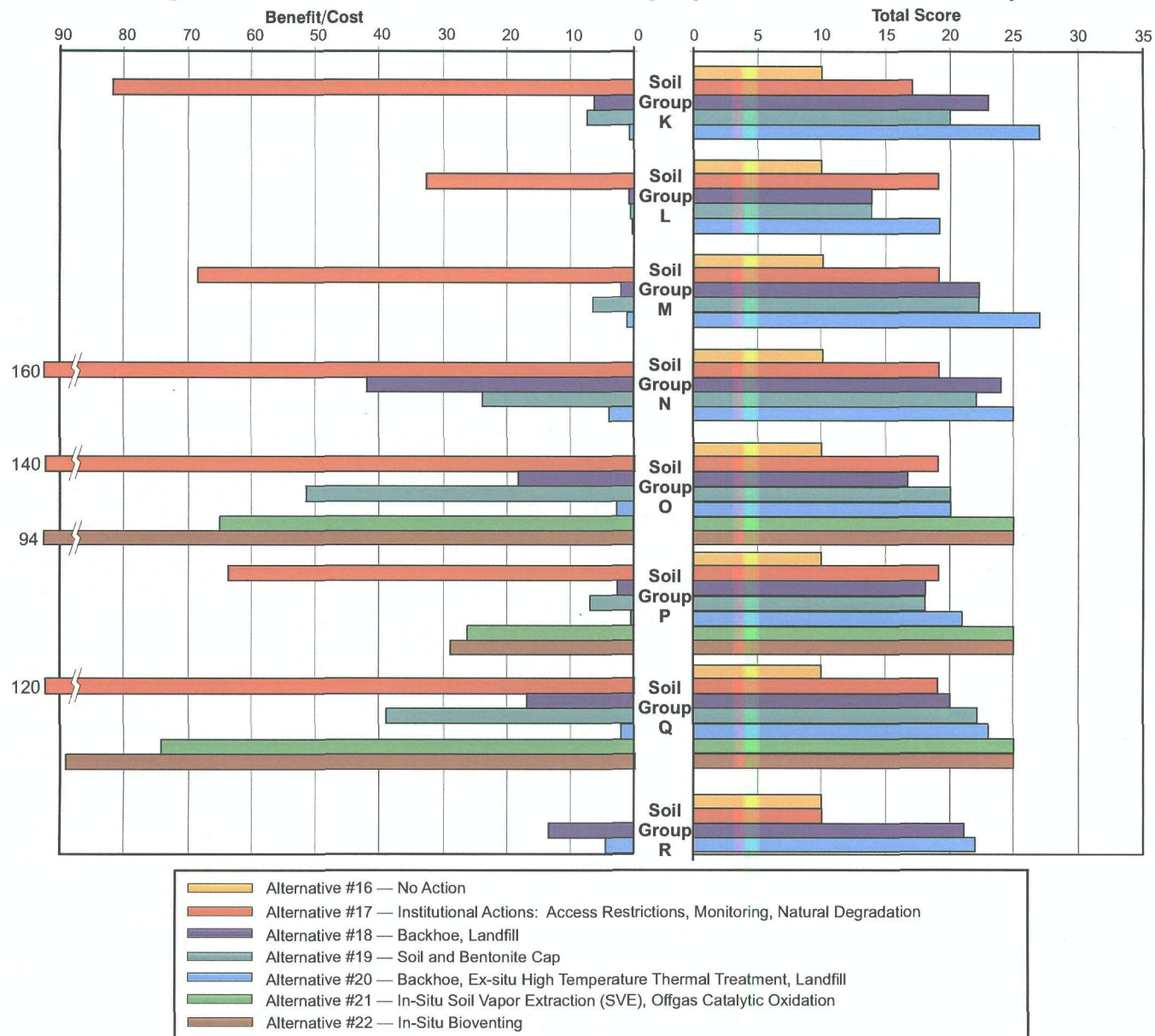
**Figure II-4-1.
Alternatives for Surface Water Group J**



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Figure II-4-2. Alternatives for Soil Groups (K, L, M, N, O, P, Q and R)



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Table II-4-4

Summary of Total Scores, Present Worth Costs, and Benefit/Cost Ratios for Surface Water
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Total Score	Cost	Benefit/Cost Ratio
Alternative #10	10	\$0	NA
Alternative #11	14	\$2.6M	2.3
Alternative #12	25	\$14M	1.5
Alternative #13	21	\$9.1M	1.6
Alternative #14	20	\$0.39M	31
Alternative #15	25	\$0	NA

Alternative #10: No Action
 Alternative #11: Institutional Actions (Access Restrictions, Monitoring, Natural Attenuation)
 Alternative #12: Collection Sump, Ion Exchange, Activated Carbon, Discharge to Union Creek
 Alternative #13: Collection Sump, Activated Carbon, Discharge to Union Creek
 Alternative #14: Slip-Lining and Collaring Storm Sewer
 Alternative #15: Source Control

NA = not applicable
 NEWIOU = North/East/West Industrial Operable Unit
 ROD = record of decision

Note: The estimated present worth cost is in millions (M) of dollars.

Table II-4-5 summarizes the evaluation of alternatives for soil groups K through R. Table II-4-6 shows the alternatives' total scores and benefit/cost ratios for soil, and Table II-4-7 shows the alternatives' total present worth costs for soil. The highest total scores are generally associated with alternatives that treat contaminants and provide protection from exposure. Alternative 20 has the highest total score for Groups K, L, M, N, and R. For Groups O, P, and Q, Alternatives 21 and 22 have the highest total score. As previously indicated, Figure II-4-2 shows a bar chart comparing alternatives' total scores and benefit/cost ratios for each group.

Table II-4-5

Soil Groups Evaluation Summary
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Group	Most Cost Effective ^a	Highest Benefit ^b
K	Alternative 17 (82)	Alternative 20 (27)
L	Alternative 17 (33)	Alternative 20 (19)
M	Alternative 17 (69)	Alternative 20 (27)
N	Alternative 17 (160)	Alternative 20 (25)
O	Alternative 17 (140)	Alternative 20 (25)
P	Alternative 17 (64)	Alternatives 21 and 22 (25)
Q	Alternative 17 (120)	Alternatives 21 and 22 (25)
R	Alternative 17 (43)	Alternatives 21 and 22 (22)

^a Highest benefit/cost ratio is shown in parenthesis.

^b Highest total of effectiveness criteria score is shown in parenthesis.

Alternative #16: No Action
 Alternative #17: Institutional Actions (Access Restrictions, Monitoring, Natural Attenuation)
 Alternative #18: Backhoe, Disposal at Existing Off-Site Landfill
 Alternative #19: Soil and Bentonite Cap
 Alternative #20: Backhoe, Ex Situ High Temperature Thermal Treatment, Disposal at Existing Off-Site Landfill
 Alternative #21: In Situ Soil Vapor Extraction (SVE), Off-Gas Catalytic Oxidation
 Alternative #22: In Situ Bioventing

NEWIOU = North/East/West Industrial Operable Unit ROD = record of decision

Table II-4-6

Summary of Total Scores and Benefit/Cost Ratios for Soil^a

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Group	Alternative #16	Alternative #17	Alternative #18	Alternative #19	Alternative #20	Alternative #21	Alternative #22
K	10 0	17 82	22 5.9	20 7.4	27 0.61	NA	NA
L	10 0	19 33	14 0.92	14 0.67	19 0.09	NA	NA
M	10 0	19 69	22 2.2	22 6.4	27 1.0	NA	NA
N	10 0	19 160	24 42	22 24	25 4.1	NA	NA
O	10 0	19 140	17 18	20 52	20 2.5	25 65	25 94
P	10 0	19 64	18 3.0	18 7.5	21 0.35	25 27	25 29
Q	10 0	19 120	20 17	22 39	23 2.1	25 74	25 89
R	10 0	10 0	21 13	NA	22 4.4	NA	NA

^a These total scores and benefit/cost ratios were derived from analyses of how alternatives would address soil that poses a risk to human health and ecological receptors. Total scores are indicated on the left side of the column, and benefit/cost ratios are indicated on the right side.

Alternative #16: No Action

Alternative #17: Institutional Actions (Access Restrictions, Monitoring, Natural Attenuation)

Alternative #18: Backhoe, Disposal at Existing Off-Site Landfill

Alternative #19: Soil and Bentonite Cap

Alternative #20: Backhoe, Ex Situ High Temperature Thermal Treatment, Disposal at Existing Off-Site Landfill

Alternative #21: In Situ Soil Vapor Extraction (SVE), Off-Gas Catalytic Oxidation

Alternative #22: In Situ Bioventing

NA = not applicable

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Table II-4-7Summary of Total Present Worth Costs for Soil^a*North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California*

Group	Alternative #16	Alternative #17	Alternative #18	Alternative #19	Alternative #20	Alternative #21	Alternative #22
K	\$0	\$0.11M	\$2.7M	\$1.9M	\$38M	NA	NA
L	\$0	\$0.27M	\$13M	\$18M	\$190M	NA	NA
M	\$0	\$0.13M	\$7.4M	\$2.2M	\$22M	NA	NA
N	\$0	\$0.057M	\$0.38M	\$0.58M	\$5.1M	NA	NA
O	\$0	\$0.064M	\$0.50M	\$0.23M	\$6.4M	\$0.26M	\$0.18M
P	\$0	\$0.14M	\$4.0M	\$1.6M	\$55M	\$0.63M	\$0.58M
Q	\$0	\$0.073M	\$0.71M	\$0.31M	\$9.1M	\$0.23M	\$0.19M
R	\$0	\$0.1M	\$0.3M	NA	\$3.6M	NA	NA

^a Costs are in millions (M) of dollars.

Alternative #16: No Action

Alternative #17: Institutional Actions (Access Restrictions, Monitoring, Natural Attenuation)

Alternative #18: Backhoe, Disposal at Existing Off-Site Landfill

Alternative #19: Soil and Bentonite Cap

Alternative #20: Backhoe, Ex Situ High Temperature Thermal Treatment, Disposal at Existing Off-Site Landfill

Alternative #21: In Situ Soil Vapor Extraction (SVE), Off-Gas Catalytic Oxidation

Alternative #22: In Situ Bioventing

NA = not applicable

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Because cost generally varies more than effectiveness scores, it is the most important factor in the ranking of benefit/cost scores between alternatives within groups. In most groups, the highest benefit/cost ratings are associated with alternatives that provide at least some protection from contaminants at relatively little cost. Alternative 20 has the highest present worth costs for all groups, while Alternative 17 consistently has the lowest present worth cost.

Some of the conclusions in the FS have been changed based on more recent data and risk evaluation. For example, Travis AFB has determined that Alternative 16 (No Action) meets threshold criteria for those soil sites for which this alternative was selected, and that Alternative 17 (Land Use Controls) complies with ARARs for those sites for which it is selected. The Air Force has determined that all the selected remedies meet the threshold criteria.

4.4 Corrective Action Management Unit (CAMU)

The CAMU is an important strategy at Travis AFB for the on-base consolidation of contaminated soil. It is proposed in this ROD that NEWIOU soils be consolidated in the CAMU. A CAMU is a designated area within a facility that is designed to carry out a corrective action, such as the management of contaminated soil. The state and federal CAMU regulations were written to give regulatory agencies greater flexibility in selecting and implementing the most effective and appropriate waste management strategy for the cleanup of large complex facilities, such as Travis AFB.

The final CAMU rules are found in 40 Code of Federal Regulations (CFR) 264.552. These regulations have been adopted under the California RCRA program and are found in Title 22, California Code of Regulations (CCR), Section 66264.552. The U.S. EPA proposed a new CAMU regulation at 65 Fed. Reg. 51080, 22 August 2000, that allowed a facility to use the existing CAMU regulations if a substantially complete CAMU proposal was submitted prior to 20 November 2000. This new CAMU regulation has been finalized at 67 Fed. Reg. 2961, 22 January 2002; 40 CFR 264.550(b) and has been incorporated into 22 CCR 66264.552. The California grandfathering provision is at 22 CCR 66264.550. The regulatory agencies concurred in the WABOU Soil ROD that Travis AFB met the substantive portion of the grandfathering provisions of these regulations prior to the deadline.

The CAMU allows for more flexibility when managing remediation wastes and leads to the expeditious implementation of protective and cost-effective remedies at CERCLA sites. Historically, hazardous waste regulations have discouraged digging up contaminated materials and properly managing them. Excavating contaminated materials triggered requirements, such as land disposal restriction (LDR) treatment standards and minimum technology requirements (MTRs), whereas leaving the contaminated material in place, while less protective, usually led to a much simpler and less expensive remedy. As a result, many owners of contaminated property selected less effective containment actions over ex situ management. In recognition of this, in 1993, U.S. EPA promulgated the CAMU Rule to provide regulatory relief. Under the CAMU Rule, placement of remediation waste into a CAMU did not constitute land disposal and, therefore, LDRs and MTRs did not apply. The Air Force has concluded, and the regulatory agencies have agreed, that consolidating contaminated material excavated at Travis AFB into a CAMU is practical and will protect human health and the environment. Excavating contaminated material and sending it off site to a hazardous waste landfill would not be significantly

more protective (it might be less protective) and was not felt to be practicable because of the high cost.

There are several advantages to the CAMU approach.

- The consolidation of contaminated soil would provide needed material for the construction of the LF007 cap. This would reduce the amount of clean soil that would have to be purchased.
- A large quantity of contaminated soil would never have to leave Travis AFB, avoiding the transport of this soil by truck on major roads and highways. This would reduce air emissions, noise, and the risk of vehicle accidents associated with the cleanup actions.
- The amount of soil that would have to go to commercial off-base landfills would be reduced. This would extend the functional life of these landfills.
- The amount of paperwork generated to track the contaminated soil would be significantly reduced, resulting in a project management cost reduction.
- The use of a CAMU would significantly reduce the cost of cleaning up the other ERP soil sites by reducing or eliminating off-base landfill disposal fees.

Landfill 2 (LF007) is a soil site in the NEWIOU that has been selected as the location for the CAMU. Designation of the CAMU to consolidate soil for the WABOU was part of the WABOU Soil ROD (Travis AFB, 2002a). This landfill was used from the 1950s through the 1970s as a base municipal landfill. As part of the maintenance of the landfill, a large quantity of soil was used to fill in depressions in the soil and cover over the existing waste to provide good surface drainage. This grading also formed the foundation for an ET cap or final ET cover. The ET cover prevents people, animals, and plants from coming in contact with the waste. The ET cover also controls infiltration of rainwater, thereby reducing the leaching of contaminants and protecting groundwater. More details on the final ET cover system are provided in the *LF007 Soil Remedial Action Design Report and Post-Closure Maintenance Plan* (CH2M HILL, 2002). For Travis AFB to place contaminated soil within the CAMU as part of the foundation for the cap over part of LF007, the contaminated soil must meet acceptance criteria that are protective of groundwater. The consolidation requirements are used to ensure compatibility between contaminated soil coming from different sites and compatibility with existing landfill waste and cap materials.

In evaluating whether the use of a CAMU for on-site consolidation of remediation wastes is a viable option, the following seven criteria were considered and met.

1. The CAMU must facilitate the implementation of reliable, protective, and cost-effective corrective action measures.
2. Waste management activities associated with the CAMU shall not create unacceptable risks to humans or the environment.
3. The CAMU shall incorporate uncontaminated areas only if the inclusion of such areas allows better protection.

4. Areas within the CAMU where wastes remain in place after closure of the CAMU shall be managed and contained to minimize the potential for future releases.
5. The CAMU shall expedite the implementation of corrective measures.
6. The CAMU shall enable the use of treatment technologies to enhance long-term effectiveness of corrective actions by reducing the toxicity, mobility, or volume of wastes.
7. To the extent practicable, the CAMU shall minimize the land areas where wastes will remain in place after closure of the CAMU.

To demonstrate that the contaminated soil to be placed in the CAMU will not impact the underlying groundwater in excess of beneficial use objectives (maximum contaminant levels [MCLs]), the Air Force conducted a leachability assessment using the California Waste Extraction Test modified to use deionized water as the extractant (DI WET). A site-specific dissociation constant was calculated by dividing the leachate concentration by the total soil concentration. The CAMU acceptance levels were calculated using the product of the water quality objective, the dissociation constant, and a dilution/attenuation factor as modeled in consideration of the landfill cover and the CAMU cap design. The *Corrective Action Management Unit Soil Acceptance Criteria* Technical Memorandum (Radian, 2001) provides a more detailed description of the leachate assessment.

In the CAMU soil acceptance criteria document, soil and leachate acceptance levels were developed with guidance from the San Francisco Bay RWQCB. They are designed to be protective of groundwater beneficial use objectives. The acceptance levels were developed using SESOIL modeling, RI data, and DI WET analytical results. (Soil samples from Travis AFB were collected and analyzed using the DI WET to have site-specific data on the potential leaching of several contaminants from soils.) The SESOIL modeling, the initial review of RI data, the DI WET results, and the proposed CAMU design support establishing the acceptance levels based on drinking water standards. Modeling results based on CAMU design features show that leachate concentrations of 100 times the MCLs will attenuate in the underlying soil and will result in leachate concentrations at the water table that are less than MCLs. The soil acceptance criteria are protective of groundwater; therefore, the CAMU will not be constructed with a liner and leachate collection and recovery system.

In addition to the protectiveness of the soil acceptance criteria, soil conditions at Travis AFB and the design of the CAMU further ensure the protection of groundwater beneficial use objectives. The soils at Travis AFB are fine-grained silty loams, clay loams, and loams, and the types of contaminants in soil have a natural affinity to sorb to soil, thus reducing potential migration downward. The Air Force plans to use an ET cover to minimize infiltration of water into the consolidated soil, and the fine-grained nature of the soil will impede the percolation and movement of contaminants. The consolidated soil will be placed on top of the subgrade, and then covered with a 4-foot-thick ET cover. The CAMU is designed to include a minimum 5-foot separation between the consolidated soil and the seasonal high groundwater table. The 5-foot separation further protects groundwater beneficial use objectives.

5.0 Selected Remedial Actions

The Air Force and U.S. EPA evaluated and co-selected remedial actions for the 18 NEWIOU soil, sediment, and surface water sites. The State of California, through the Cal-EPA/DTSC and the San Francisco Bay RWQCB, concurs with the selected soil, sediment, and surface water remedies. Each of the selected remedies will be protective of human health and the environment and will comply with ARARs. The remedies are effective at reducing contaminant exposure, are implementable and cost-effective, and are acceptable to the public. The Air Force based the selection of these remedial actions on environmental and land use considerations and the nature and extent of contamination found at each site. U.S. EPA guidance and criteria evaluations and available technology were additional factors used in the selection process.

The Air Force is responsible for implementing, maintaining, and monitoring the remedial actions identified herein for the duration of the remedies selected in this ROD. It will exercise this responsibility in accordance with CERCLA and the NCP.

Meeting RAOs will be the primary and fundamental indicator of performance, the ultimate aim of which is protecting human health and the environment. Performance measures for LUCs are defined herein as the RAOs plus the actions required to achieve the defined objectives. It is anticipated that successful implementation, operation, maintenance, and completion of these measures will achieve protective and legally compliant remedies.

The following subsections present the selected remedial action at each site, the soil or sediment cleanup levels for the sites that require active remedial actions, and the rationale for the selection. Figures showing conceptual designs for the selected soil remedial actions are included following the rationale for the selected remedy.

5.1 Description of Selected Remedial Alternatives

The Air Force evaluated six potential remedial alternatives to address contaminated surface water in the NEWIOU and seven potential remedial alternatives to address contaminated soil and sediment in the NEWIOU. Table II-5-1 presents a description of the evaluated remedial alternatives.

Subsequent to the evaluation of alternatives, the Air Force selected remedial actions for the 18 NEWIOU sites addressed in this ROD. Alternatives 10, 16, 17, and 18 were selected remedial actions, as further described hereafter.

5.1.1 Alternative 10—No Action for Surface Water

Alternative 10 means no physical or administrative action is required for surface water at a site. The surface water at the site does not present an unacceptable risk to ecological or human receptors. While not a remedy implemented under this ROD, extraction and treatment of groundwater, implemented under the NEWIOU and WABOU Groundwater IRODs, addresses contaminated groundwater and prevents possible contamination movement to

Table II-5-1

Evaluated Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Cleanup Alternative^a	Description
Surface Water Remedial Alternatives^a	
10. No Action	Federal regulations require the use of this alternative as a starting point for comparing the other alternatives. Under this alternative, no surface water treatment takes place.
11. Institutional Actions	Surface water would be monitored to determine the levels of contamination over time. No active treatment of the water is involved. The Base General Plan will be updated after the ROD is signed to note that the surface water is being monitored and not for use.
12. Collection Sump, Ion Exchange, Activated Carbon, Discharge to Union Creek	Water is pumped into a collection sump, where it is held and treated. Two forms of treatment are used. First, ion exchange uses special resins to remove metals from the water. Second, the water, still contaminated with organic contaminants, is then passed through charcoal filters. The contaminants adsorb onto the charcoal, which can later be regenerated to remove the contaminants. Treated water is discharged (in accordance with effluent discharge limits) to Union Creek, which empties into the Suisun Marsh via the Hill Slough.
13. Collection Sump, Activated Carbon, Discharge to Union Creek	Same as Alternative 12, without ion exchange. This alternative would be used at sites without metal contamination.
14. Slip-Lining and Collaring Storm Sewer	During slip-lining, a plastic pipe is installed within an existing deteriorated storm sewer pipe, thereby limiting infiltration of contaminated groundwater into the storm sewer system. Collars are external barriers installed along the pipe to prevent contaminated water from moving through the gravel surrounding the pipe.
15. Source Control	Source control relies on treating contamination at the source, before it is discharged into a creek. Pump and treat interim actions to address contaminated groundwater will prevent possible contaminant movement to surface water. Periodic cleanout of storm sewers and sumps also will prevent contaminants from reaching the creek.
Soil and Sediment Remedial Alternatives^a	
16. No Action	Federal regulations require the use of this alternative as a starting point for comparing the other alternatives. Under this alternative, no soil or sediment treatment takes place.
17. Land Use Controls	Future land use and soil and sediment disturbance activities are restricted. The Base General Plan will be updated after the ROD is signed to reflect any specific restrictions required at each site.
18. Excavation	Contaminated soils are excavated and removed to a designated CAMU at Travis AFB or to an off-base landfill.
19. Cap	The site is covered with a material such as asphalt, concrete, synthetic membrane, or soil and /or clay. For landfill areas, the area also is graded to control runoff, thereby minimizing the potential for rainwater to move through contaminated soil, to protect the groundwater below from contamination.
20. Excavation, Ex Situ High Temperature Thermal Treatment, Disposal at Landfill	Contaminated soil is excavated and treated at high temperatures (for example, in a rotary kiln incinerator). As a result, organic contaminants are destroyed through conversion to carbon dioxide, water, and hydrochloric acid. The acid is then removed. Treated soil is placed at the designated CAMU or at an off-base landfill.

Table II-5-1 (Cont'd)

Evaluated Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Cleanup Alternative^a	Description
Soil and Sediment Remedial Alternatives^a (cont'd)	
21. In Situ Soil Vapor Extraction (SVE), Off-Gas Treatment	Contaminated soil vapor is extracted from the ground to remove contaminants. The contaminated vapors are then treated by catalytic or thermal oxidation, which converts VOCs to carbon dioxide, water, and hydrochloric acid. The acid is then removed.
22. In Situ Bioventing	Air is injected below the ground surface to encourage the growth of microorganisms in the soil. Microorganisms can help break down certain VOCs.
^a Surface water alternatives are numbered 10 through 15, and soil and sediment alternatives are numbered 16 through 22 to be consistent with the numbers used in the NEWIOU Feasibility Study (Radian Corporation, 1996a). Groundwater alternatives were numbered 1 through 9.	
CAMU = Corrective Action Management Unit	ROD = record of decision
NEWIOU = North/East/West Industrial Operable Unit	VOC = volatile organic compound

surface water. The NEWIOU SSSW Proposed Plan proposed Alternative 15, "Source Control" (groundwater extraction and treatment) for surface water at SD001 and SD033, indicating Union Creek is not a source of contamination, but that the creek may be receiving TCE-contaminated water from groundwater through storm sewer infiltration. Subsequent to the NEWIOU SSSW Proposed Plan, extraction and treatment (pump and treat) of contaminated groundwater was implemented as part of the WABOU and NEWIOU Groundwater IRODs. GSAP sampling has shown that extraction of groundwater has reduced the levels of TCE in the creek to levels that do not pose a risk to human health or the environment. As "Source Control" has already been implemented under these groundwater IRODs, "No Action" will be implemented under this ROD for surface water. As with all the remedies initiated under the groundwater IRODs, the source control remedy will be re-evaluated in the Travis AFB Basewide Groundwater ROD.

5.1.2 Alternative 16—No Action for Soil or Sediment

Alternative 16 means no further physical or administrative action is required for soil or sediment at a site. The soil and sediment do not present unacceptable risks to ecological or human receptors and are suitable for unrestricted residential or industrial activities.

5.1.3 Alternative 17—Land Use Controls

As discussed in more detail in Section 5.4, Land Use Controls, Alternative 17, restricts residential development (including day care centers, kindergarten through 12th grade (K-12) schools, play areas, and hospitals) and prevents unauthorized disturbance and relocation of the contaminated soil (such as use of excavated contaminated soil as fill) at areas where soil contamination is at levels that do not allow for unlimited use and unrestricted exposure. For the CAMU cover at LF007, Alternative 17 prohibits all activities on the cover other than CAMU operations and maintenance activities as described in the *LF007 Soil Remedial Action Design Report and Post-Closure Maintenance Plan* (CH2M HILL, 2002). Alternative 17 also prevents unauthorized disturbance and relocation of contaminated sediment.

5.1.4 Alternative 18—Excavation

Alternative 18 is described in the NEWIOU SSSW Proposed Plan as excavation of contaminated soil and removal to a designated CAMU at Travis AFB or to an off-base landfill. Travis AFB will comply with the off-site requirements of 40 CFR Section 300.440 for any soil removed to an off-base landfill. Since the Proposed Plan was issued, the Air Force has built a CAMU within the boundaries of LF007, a Base landfill that was closed and capped with native soil in 1974. The WABOU Soil ROD (Travis AFB, 2002a) provided the authority to build the CAMU. In 2003, excavated soil from three WABOU sites and the SS015 soil removal action were consolidated in the CAMU and capped with an ET cap.

The Air Force and regulatory agencies have established CAMU soil acceptance levels to determine the contaminant types and soil concentrations that can be placed in the CAMU. These requirements are presented in Table II-5-2. The following is the acceptance level sampling process that supports the placement of soil in the CAMU.

- If sample results for excavated contaminated soil are less than the “Soil Acceptance Level” for each COC or COEC at the site, the soil will go to the CAMU.
- If any results are greater than those levels, a DI WET leaching test will be performed for the COCs/COECs in question.
- If the DI WET results are less than the “Leachate Acceptance Level” for each COC or COEC in question, the soil will go to the CAMU.
- If the DI WET results are greater than the “Leachate Acceptance Level” for any COC or COEC in question, the soil will be segregated and evaluated for treatment or transported to an appropriate permitted off-base landfill for disposal.

Figure II-5-1 presents the acceptance level sampling process as a decision tree. The *Corrective Action Management Unit Soil Acceptance Criteria* Technical Memorandum (Radian, 2001) explains the development of CAMU acceptance levels.

Based on the most recent data, most, if not all, of the soil and sediment excavated from NEWIOU sites should meet CAMU soil acceptance levels and be suitable for placement in the CAMU. For these soils, the availability of the CAMU eliminates any need for thermal treatment of soil (Alternative 20) prior to disposal.

For additional information, The *LF007 Soil Remedial Action Design Report and Post-Closure Maintenance Plan* (CH2M HILL, 2002) addresses the CAMU design and maintenance. The *LF007 Soil Remedial Action Phase I Landfill Cap, CAMU Subgrade, Wetland Mitigation Report* (Shaw E&I, 2003) summarizes the construction of Phase 1 of the CAMU, including performing maintenance on the existing landfill cap, preparing the foundation for the CAMU, and constructing new wetlands to mitigate for wetlands filled in for cap maintenance. The *LF007 Phase 2 Soil Remedial Action Report* (Shaw E&I, 2004) summarizes the construction of Phase 2 of the CAMU, which involved consolidating and capping soil from four ERP sites. Additional phase(s) of CAMU construction will be used to add and cap excavated soil from NEWIOU sites, as specified in this ROD.

Table II-5-2

CAMU Soil Acceptance Levels^a

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant	CAMU – Soil Acceptance Level (mg/kg)	CAMU – Leachable Acceptance Level (DI-WET Results µg/L)	Contaminant	CAMU – Soil Acceptance Level (mg/kg)	CAMU – Leachable Acceptance Level (DI-WET results µg/L)
Aluminum	35,500	100,000	Benzo(k)fluoranthene	184	92
Antimony	74	600	bis(2-Ethylhexyl) phthalate	1,893	400
Arsenic	1,000	5,000	Carbon Disulfide	0.52	1,000
Barium	1,096	100,000	Chrysene	542	920
Cadmium	7.50	500	4,4'-DDD	25	28
Chromium	840	5,000	4,4'-DDE	4	20
Copper	5,174	130,000	Dibenzo(a,h)anthracene	11	0.92
Lead	854	1,500	Dieldrin	0.030	0.420
Mercury	64	200	Di-n-butyl phthalate	87,700	370,000
Molybdenum	360	18,000	Dioxin as 2,3,7,8-TCDD(eq)	0.034	0.0030
Nickel	122	10,000	Endosulfan	0.31	220
Selenium	550	5,000	Endosulfan sulfate	NE	NE
Silver	24,360	10,000	Fluoranthene	43,785	150,000
Vanadium	26,000	26,000	Fluorene	1,272	24,000
Zinc	6,350	500,000	Gamma Chlordane	17.39	10
Acenaphthene	1,776	37,000	Heptachlor	2.6	1.00
Alpha Chlordane	38.6	10	Heptachlor epoxide	0.052	1.00
Anthracene	27,200	180,000	Indeno(1,2,3-cd)pyrene	15	9.20
Aroclor-1254	184	50	Methoxychlor	2,173	4,000
Aroclor-1260	75	50	Methoxone	NE	NE
Benzo(a)anthracene	25	10	Phenanthrene	112	630
Benzo(a)pyrene	164	20	Pyrene	4,788	18,000
Benzo(b)fluoranthene	65	9.2	Toxaphene	3.17	300

^a Soil includes sediment.

CAMU = Corrective Action Management Unit

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethene

DI WET = deionized water waste extraction test

mg/kg = milligrams per kilogram

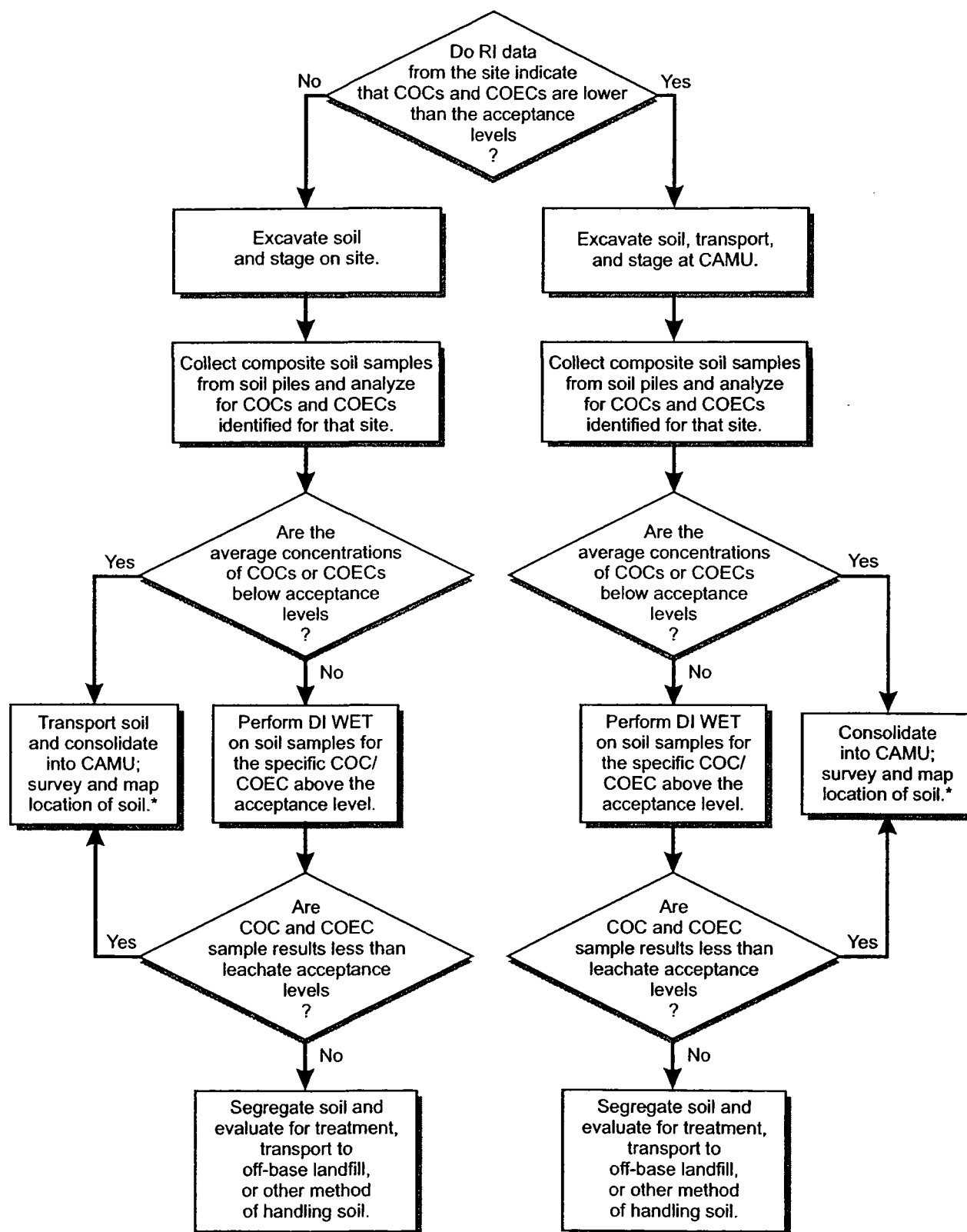
NE = Not established because there is not an established drinking water standard or adsorption coefficient for this compound.

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

TCDD(eq) = tetrachlorodibenzo-p-dioxin equivalent

µg/L = micrograms per liter



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* Soil that is acceptable for consolidation to the CAMU may still be transported for off-base disposal.

Figure II-5-1. Acceptance Level Sampling Process

5.2 Criteria Used to Determine Soil and Sediment Cleanup Levels

The selected soil and/or sediment cleanup levels for COCs and COECs at each site represent the residual site-specific contaminant concentrations that can remain after completion of a remedial action and are protective of human health, ecological receptors, and the environment. Since no chemical-specific ARARs that establish soil (including sediment) cleanup levels exist, the following subsections present the criteria that provide the basis for the cleanup levels for soil and sediment at the NEWIOU sites. Surface water cleanup levels were not developed because Alternative 10 (No Action) is the selected alternative for surface water under this ROD. GSAP sampling has shown that extraction of groundwater has reduced the levels of TCE in the creek to levels that do not pose a risk to human health or the environment.

5.2.1 Residential/Industrial Exposure Scenarios

When reviewing text or tables that address cleanup concentrations and associated risk values, it is important to consider the criteria used in calculating the risk values. At Travis AFB, the residential and industrial exposure scenarios provided the two sets of criteria used in risk calculations.

The residential exposure scenario, the more conservative of the two, assumes that the site is available for any possible use. In this scenario, the risk assessor makes assumptions about the amount of potential chemical exposure that a resident may receive. Since the assumptions for this scenario represent the maximum potential exposure, the residential risk calculations usually result in high values. The residential exposure scenario is used to determine the need for land use controls.

The industrial exposure scenario assumes that the site is available for industrial use only. In this scenario, the risk assessor makes assumptions about the amount of potential chemical exposure a site worker may receive. The assumptions for this scenario are appropriate for a healthy adult at the site during normal working hours in minimally protective clothing and represent a lower potential exposure. The industrial risk calculations usually result in lower values.

The Air Force reviewed the U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-30 (page 5), shown hereafter, to select the appropriate exposure scenario for Travis AFB.

The preamble to the NCP states that U.S. EPA will consider future land use as residential in many cases. In general, residential areas should be assumed to remain residential; and undeveloped areas can be assumed to be residential in the future unless sites are in areas where residential land use is unreasonable. *Often the exposure scenarios based on potential future residential land use provide the greatest risk estimates (e.g., reasonable maximum exposure scenario) and are important considerations in deciding whether to take action (55 Fed. Reg. at 8710).*

However, the NCP also states that “the assumption of future residential land use may not be justifiable if the probability that the site will support residential use

in the future is small." Sites that are adjacent to operating industrial facilities can be assumed to remain as industrial areas unless there is an indication that this is not appropriate. Other land uses, such as recreational or agricultural, may be used, if appropriate. When exposures based on reasonable future land use are used to estimate risk, the NCP preamble states that the ROD "should include a qualitative assessment of the likelihood that the assumed future land use will occur" (55 Fed. Reg. at 8710).

Travis AFB is host to the largest airlift organization in the Air Force, with a versatile fleet of C-5 Galaxy cargo aircraft and KC-10 Extender refueling aircraft to support its strategic airlift mission. The Base is also the west coast terminus for aeromedical aircraft returning sick or incapacitated military personnel from the Pacific and is a west coast port of embarkation for military personnel. Travis AFB is undergoing an extensive construction program that is replacing aging inefficient buildings with new facilities and upgrading existing structures to better conform to their functions. There is a large geographical separation between the northern residential housing areas and the southern industrial areas on Travis AFB. All of the NEWIOU sites are located within or adjacent to industrial facilities. In summary, the number of personnel, units, and assigned mission responsibilities at Travis AFB have grown over the past few years. The present land use near all NEWIOU sites is industrial in nature, and there are no solid indications that this condition will change in the near future. Therefore, the use of industrial criteria in deriving cleanup levels is appropriate for the NEWIOU soil sites. Land use controls will be implemented, monitored, maintained, and enforced as described in Section 5.4 (Land Use Controls).

5.2.2 Risk Management

Risk management is the process of making decisions concerning a site, taking into account the potential risk posed by contaminants, the cost of cleaning up the contaminants, the present and future use of the land, and other site conditions. The following subsections describe risk management decisions that were applied to the NEWIOU soil sites.

5.2.2.1 Risk Management Range

The Air Force has selected soil cleanup levels that equate to an acceptable exposure level. The rationale for deciding on an acceptable exposure level at a site is based on 40 CFR 300.430(e)(2)(i)(A)(2) of the NCP, shown hereafter.

For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response.

Consistent with this language, the Air Force will ensure that any residual soil contaminants after completion of a remedial action will fall within or below the 10^{-4} to 10^{-6} risk range. For each site, the specific cleanup level within that range must be determined based on site-specific factors. The NCP at 40 CFR 300.430(e)(2)(i)(A)(2) further states the following:

The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not

sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.

Therefore, the 10^{-6} risk level and the industrial exposure scenario are the basis for cleanup concentrations at NEWIOU soil sites. These concentrations provide a margin of safety for workers, since Travis AFB is an industrial facility, as described in Section 5.2.1 (Residential/Industrial Exposure Scenarios), and conservative exposure assumptions were used in the risk calculations. As explained in Section 5.2.3, for this NEWIOU SSSW ROD, PRGs are used to achieve this risk level.

5.2.2.2 Point of Departure

As a military facility, Travis AFB uses several self-imposed land use controls to maintain security and ensure safety for site workers. These restrictions also serve as potential mitigating factors to depart from the 10^{-6} risk level at sites within certain portions of the Base. After a review of these factors and their locations in relation to the NEWIOU soil, sediment, and surface water sites, no sites were found to warrant a departure from the 10^{-6} risk level. However, various factors, such as restricted areas, security areas, proximity to the runway, and bird/air strike hazard (BASH) areas, were considered at some sites in the risk-management decision-making process. Section 5.3 (Site-Specific Remedial Actions) discusses in more detail the use of these factors in the selection of remedial actions.

5.2.2.3 Consideration of Site Conditions

The Air Force used an initial screening approach that involved only numerical risk values to determine whether a soil site required a cleanup action. However, in working with the regulatory agencies to resolve legal and technical issues, the Air Force elected to apply a risk management strategy described in OSWER Directive 9355.0-30, the *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions* (U.S. EPA, 1991), to the 18 NEWIOU soil, sediment, and surface water sites. This resulted in an approach wherein the Air Force first determines whether the soil contamination levels exceed industrial use levels. If industrial use levels are exceeded, removal of those soils to the CAMU or an off-site disposal site is the remedial action. If contamination levels do not exceed industrial levels but do exceed residential levels, then Alternative 17 (Land Use Controls) is selected to provide an adequate measure of protection for site workers at these sites.

5.2.3 Human Health Exposure for Carcinogens and Non-Carcinogens

The NOU, EIOU, and WIOU HHRAs evaluated potential threats to human health from chemicals found at soil, sediment, and surface water sites in the absence of any remedial action. This information was used to determine which sites needed further evaluation and possible remedial action. Section 3.2.1 (Human Health Risk Assessment) presents a brief summary of the NOU, EIOU, and WIOU HHRAs.

Following lengthy negotiations with the regulatory agencies encompassing both the previously executed WABOU Soil ROD and this NEWIOU SSSW ROD, the Air Force accepted the U.S. EPA's recommendation to use the current PRGs (Smucker, 2004) as a basis for soil cleanup levels for carcinogenic chemicals that equate to a fixed level of risk (1×10^{-6}) and for non-carcinogenic chemicals that equate to a fixed level of risk ($HI = 1$). PRGs are "TBCs," not federal

and state ARARs. TBCs include nonpromulgated criteria, advisories, guidance, and proposed standards issued by federal or state governments. By definition, ARARs are promulgated, or legally enforceable, federal and state requirements. TBCs are not ARARs because they are not promulgated requirements. The Air Force accepted human health cleanup levels based on PRGs for NEWIOU soil and sediment sites because most sites have multiple contaminants and a cumulative risk that needs to be addressed. While using these PRGs potentially results in cleanup levels more conservative than required, Travis AFB determined that its site-specific situations with multiple contaminants justified accepting the PRG-based cleanup levels. Travis AFB estimated the expense of justifying less conservative cleanup levels to the regulators in terms of time and money and ultimately determined that accepting the PRG-based cleanup levels will result in minimal incremental cleanup costs. This approach has already worked well under the WABOU Soil ROD. Cleanup levels based on PRGs will be used unless there are site-specific considerations that justify a less stringent cleanup level. In this ROD, there are no sites where a less stringent cleanup level was used. Surface water cleanup levels were not developed because Alternative 10 (No Action) is the selected alternative for surface water sites. Extraction and treatment of groundwater has been implemented as part of the WABOU and NEWIOU Groundwater IRODs to control possible migration of TCE-contaminated groundwater to Union Creek. No action will be implemented under this ROD for surface water.

The Summary of Remedial Investigation Data and Risk Management Decisions for Human Health at NEWIOU Soil Sites, Travis Air Force Base, California Technical Memorandum (URS, 2004a), referred to as the Human Health Tech Memo, presents a table of PRGs and a summary of contamination data (including site maps), site characteristics, and selected alternatives and rationale for the risk management decision at each site. The Human Health Tech Memo is the basis for the protection of human health conclusions presented in Section 5.3 of this ROD. After the final Human Health Tech Memo was completed and distributed to the appropriate regulatory agencies, the U.S. EPA Region 9 published an updated list of PRGs in October 2004. The rationale and conclusions presented in Section 5.3 of this ROD were updated based on the October 2004 PRG list.

The October 2004 U.S. EPA Region 9 PRG table contains concentrations for both residential and industrial use. Since Travis AFB is an industrial facility, as described in Section 5.2.1 (Residential/Industrial Exposure Scenarios), the soil cleanup levels for each site are based on the industrial PRGs. The tables summarizing soil cleanup levels for each site requiring active remedial action (Tables II-5-3, -5, -7, -9, -11, and -13), included in Section 5.3, contain two columns for the current residential PRGs (for carcinogens and non-carcinogens) and two columns for the current industrial PRGs (for carcinogens and non-carcinogens) that equate to a potential 10^{-6} cancer risk and potential HI of 1.

5.2.4 Ecological Exposure

ERAs were completed as part of the RIs for each of the three OUs. These ERAs evaluated the potential for risk from chemicals found at NEWIOU soil, sediment, and surface water sites in the absence of any remedial action. This information was used to determine which sites needed further evaluation and possible remedial action. Section 3.2.2 (Ecological Risk Assessment) briefly summarizes the NOU, EIOU, and WIOU ERAs. The ERAs performed in the RIs consisted of pathway completeness determinations (scoping assessments) and conservative quantitative analyses (Tier 1 screening evaluations). No site-specific or Tier 2-level evaluations were performed, with the exception of tissue collection for purposes of calculating bioaccumu-

lation factors, and no risk-based recommendations were developed in these ERAs. Therefore, chemicals and receptors for which unacceptable risks were identified through the Tier 1 screening for each site were carried to a more refined Tier 2 evaluation. This tiered, risk-based ecological evaluation is documented in the *Ecological Technical Memorandum for the NEWIOU at Travis Air Force Base, California* (URS, 2005), referred to as the Eco Tech Memo. The evaluation in the Eco Tech Memo builds upon the findings and conclusions of the previous ERAs in the RIs and the basewide ERA that provided a comprehensive evaluation of Union Creek. In addition, a few new ecological receptors were added to some sites to ensure that all appropriate feeding guilds and trophic levels were represented in the ERA.

In the Eco Tech Memo, Tier 1 and Tier 2 critical toxicity values (CTVs) were estimated for each chemical and receptor and were compared to chemical concentrations detected in the relevant environmental media at each site. The CTVs represent ecologically protective concentrations in soil, sediment, or surface water that correspond to a toxicity quotient (TQ) of 1.0 for a given ecological receptor. Through this approach, the potential for adverse effects to ecological receptors was determined at each site. Chemicals found to be present at concentrations below which effects are unlikely to occur were recommended for no action. Those associated with an unacceptable level of risk were recommended for risk management or remediation.

The Eco Tech Memo presents an updated and extensive ERA and selected alternatives and rationale for the risk management decision at each site. The Eco Tech Memo is the basis for the protection of ecological receptors conclusions presented in Section 5.3 of this ROD.

5.2.5 Groundwater Protection

The Air Force evaluated the relationship between groundwater and residual soil contamination in the vadose zone at each of the 18 NEWIOU sites to determine whether remedial actions were necessary to protect the underlying groundwater. The evaluation found 10 sites where subsurface soil COCs were not found in associated groundwater and 8 sites where subsurface soil and groundwater contained one or more of the same COCs. The risk to groundwater was evaluated at each site based on surface soil, subsurface soil, and groundwater concentrations. Also considered was the depth to groundwater, environmental screening levels, inorganic reference concentrations, natural attenuation, and potential and current groundwater actions at the site. This evaluation is documented in the *Groundwater Protection at NEWIOU Soil Sites Technical Memorandum, Travis Air Force Base, California* (URS, 2004b), referred to as the Groundwater Protection Tech Memo. The conclusion of the evaluation is that no action (such as excavation or SVE) is necessary to protect groundwater from soil contamination at the NEWIOU sites.

5.2.6 NEWIOU Reference Concentrations

The NOU, EIOU, and WIOU RIs evaluated the inorganic chemicals found at soil, sediment, and surface water sites to determine whether inorganic constituents detected in samples are naturally occurring or are the result of contamination from past activities. Section 7.0 (Inorganic Constituent Evaluation) of the WIOU RI (Radian, 1996b) provides the Travis AFB reference inorganic concentrations and a more detailed discussion of the inorganic constituent evaluation used at all NEWIOU sites.

5.2.7 Vapor Intrusion

Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in buried wastes and/or contaminated groundwater can emit vapors that may migrate through subsurface solids and into air spaces of overlying buildings. In extreme cases, the vapors may accumulate in dwellings or occupied buildings to levels that may pose near-term safety hazards, acute health effects, or aesthetic problems. In most cases, however, the chemical concentrations in the subsurface are low; depending on site-specific conditions, vapors may not be present at detectable concentrations.

Sampling results in the RIs conducted in 1995 indicate low levels of VOC contamination in the soil and soil gas at NEWIOU sites, while the groundwater has significantly higher levels of contamination. No sources of VOC soil contamination were found during the RI sampling, and the low levels detected are not expected to adversely impact the groundwater, which ranges in depth from about 5 to 50 feet bgs. RI concentrations of VOCs in soil and soil gas are consistent with models of diffusion and adsorption from associated groundwater plumes, indicating that the VOC contamination in the soil is coming from the underlying contaminated groundwater plume.

In the Human Health Tech Memo, the maximum detection for each VOC found in soil gas and groundwater during the RI at each of the 18 sites in the NEWIOU SSSW ROD was compared to vapor-intrusion screening levels. The results of the vapor intrusion screening indicate a potential human health risk from vapor intrusion at all NEWIOU sites with contaminated groundwater. Off-gassing of groundwater contamination is the likely source of vapor contamination at each site, and vapor intrusion is being addressed by interim groundwater remedial actions rather than soil remedial actions. The regulatory agencies have agreed with the Air Force's request to address the indoor air/vapor intrusion pathway in the forthcoming Travis AFB Basewide Groundwater ROD. The Basewide Groundwater ROD will determine cleanup levels for groundwater that will address the vapor intrusion pathway and protection of occupants of buildings above contaminated plumes at groundwater sites.

Until the Basewide Groundwater ROD is completed, Travis will continue to operate the pump and treat systems implemented by the NEWIOU Groundwater IROD, which will reduce contamination in the groundwater. Also, until groundwater plumes are remediated, Travis AFB has administrative controls in place, such as excavation requests and the Environmental Impact Analysis Process (EIAP), to ensure that actions such as excavation and the selection of building sites prevent exposure of humans to contamination. In addition, engineered controls are used to mitigate human health risks. For example, for buildings above groundwater plumes, Travis AFB has designed and implemented passive vent systems, which are built into building foundations. The Base will continue to evaluate and mitigate risk from indoor air.

5.2.8 Total Petroleum Hydrocarbons (TPH)

During the RIs (in 1995 and 1996), many of the NEWIOU sites had residual amounts of TPH in the soil from leaks or spills associated with jet fuel, gasoline, diesel, motor oil, etc. Given the age of the contamination, the volatile constituents, such as benzene, toluene, ethylbenzene, and xylenes (BTEX), which have an established toxicological value, have volatilized or have migrated down to the groundwater. The remaining TPH does not have an established toxicological value; therefore, 100 parts per million (ppm) was used in the RIs as a screening level for

possible remedial action for TPH, based on the California State Water Resources Control Board *Leaking Underground Fuel Tank (LUFT) Field Manual* (California State Water Resources Control Board, 1989), a TBC.

In 2003, in preparation for this ROD, the Groundwater Protection Tech Memo and Human Health Tech Memo performed thorough reviews of site-specific conditions (area of contamination, percentage of samples above screening levels, current land use, likelihood of natural attenuation, etc.) and concluded that an action (excavation) was not warranted for the TPH-contaminated soil. Any subsequent determination of the need for LUCs at these sites is based on controlling any future soil excavations at sites that would present an unacceptable direct exposure risk in a residential scenario. Again, there are no established toxicological values for residual TPH. There are now, however, preliminary values that have been put forth by the Massachusetts Department of Environmental Protection (MADEP) and the TPH working group. The San Francisco Bay RWQCB has issued direct-exposure environmental screening levels (ESLs) based on these MADEP preliminary values (*Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (San Francisco Bay RWQCB, 2004). These ESLs are TBCs, not ARARS. This ROD uses the San Francisco Bay RWQCB direct-exposure ESL for a residential scenario of 2,300 ppm as a screening level for LUCs for TPH. Evaluation of site conditions against the 2,300 ppm screening level is the basis for the specification of LUCs for TPH in Section 5.3. The LUCs will remain in place unless, at some future time, it can be shown that the levels in the soil have attenuated so that they no longer pose an unacceptable direct-exposure risk in a residential scenario.

5.3 Site-Specific Remedial Actions

The following subsections present a brief description of the 18 soil, sediment, and surface water sites in the NEWIOU; the selected remedial alternative(s) for each site; and descriptions of the protectiveness of the remedial actions to human health, ecological receptors, and groundwater beneficial use objectives. The Air Force and U.S. EPA evaluated and co-selected these remedies as the most appropriate strategies for addressing contaminated soil, sediment, and surface water in the NEWIOU. These remedies address the potential human health and environmental risks that could result from the exposure of human and ecological receptors or the migration of contaminants to groundwater. A summary of selected actions is provided in Table II-5-15, Selected Remedial Alternatives, on page II-5-64.

Tables II-5-3, II-5-5, II-5-7, II-5-9, II-5-11, and II-5-13 present the soil and/or sediment cleanup levels for the sites that require active remedial action in accordance with the NCP. The shaded cells in the risk columns of these tables indicate the concentration (cancer, non-cancer, ecological, or groundwater protection) that led to the cleanup level. Where there are multiple risk drivers for the same contaminant, the lower (or more protective) cleanup level was selected (as indicated by shading in the table).

Tables II-5-4, II-5-6, II-5-8, II-5-10, II-5-12, and II-5-14 present the estimated cost of remedial alternatives evaluated for the sites that require active remedial action in accordance with the NCP. The shaded row indicates the primary remedial alternative selected. Note that the costs for Alternative 17 (Land Use Controls) are from the NEWIOU FS and NEWIOU SSSW Proposed Plan and include the cost of developing LUCs at Travis AFB. The actual costs would be less because the WABOU soil actions occurred first and initiated LUCs for the ERP.

The following subsections also provide the rationale for the selection of cleanup levels for each site. These soil and sediment cleanup levels take into account the site-specific conditions, comply with CERCLA, and are protective of human health, ecological receptors, and the environment. For sites where excavation is the selected remedy, figures showing the concentrations of COCs/COECs that exceed the cleanup level, comparison of each concentration to the cleanup level, and the proposed excavation areas are presented. The excavation areas are conservative estimates and will be refined in the site-specific remedial designs.

For clarification purposes, the NOU, EIOU, and WIOU RIs used HI to refer to a measure of non-carcinogenic risk to humans, and the NEWIOU Eco Tech Memo used the term “toxicity quotient” (TQ) to refer to a measure of ecological risk.

5.3.1 Storm Sewer Systems A and C, Union Creek (SD001)

Site Description—SD001 consists of Storm Sewer Systems (SSS) A and C and Union Creek. (System B drains areas in the WIOU and is designated as part of SD033.) All storm sewers discharge into Union Creek at Outfalls II, III, and IV. Union Creek exits Travis AFB at the southwestern tip and flows south to Hill Slough, which discharges into Suisun Marsh and ultimately to Suisun Bay. This summary presents information on contaminants in soil, sediment and surface water at SD001. Subsurface soil and groundwater contamination below the SSRW are discussed with the site summary presented for SS016.

Selected Remedial Alternative(s)— Alternative 18 (Excavation) is the selected remedial action for sediment in Union Creek in the area of sample location 0014 (shown on Figures II-5-2 and II-5-3) with concentrations of PAHs that pose a potential ecological risk. Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of PAHs remaining in sediment after excavation exceed levels that allow for unlimited use and unrestricted exposure. Alternative 16 (No Action) is the selected alternative for soil, and Alternative 10 (No Action) is the selected alternative for surface water. Groundwater extraction and treatment has been implemented as part of the WABOU and NEWIOU Groundwater IRODs to control the possible migration of TCE-contaminated groundwater to Union Creek. No action is necessary, nor will any be implemented under this ROD for surface water. Evaluations performed in the Human Health Tech Memo determined that soil, sediment, and surface water at the site do not pose a potential risk to current industrial workers or future residents. Evaluations performed in the Eco Tech Memo determined PAHs in sediment pose a potential risk to ecological receptors. The EIOU RI determined no soil, sediment, or surface water remedial action is necessary to protect groundwater. Based on RI data, all excavated sediment should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated sediment that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

Table II-5-3 presents the sediment cleanup levels for the COCs and COECs at the site.

The Air Force will excavate the PAH-contaminated sediment in Union Creek in the area of sample location 0014 based on sediment cleanup levels in Table II-5-3. Confirmation samples will be collected from the excavation to determine what contaminants, if any remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete for ecological receptors. However, land use controls will be

Legend

Crayfish Tissue Sampling

- Metals, Pesticides, PAHs
- Metals, Pesticides, PAHs, PCBs
- ▲ Sample collected and stored; not analyzed

Sediment Sampling

- Metals, Pesticides, PAHs
- Metals, Pesticides, PAHs, PCBs
- ▲ PAHs
- ✚ VOCs
- ★ VOCs, Pesticides

Surface Water Sampling

- Metals
- Metals, Pesticides

Union Creek

- Above ground
- - - Underground
- ✚ Outfall Locations
- - - Drainage Basin Boundary
- ▭ OU Boundary
- ▭ Base Boundary
- Road
- Runway

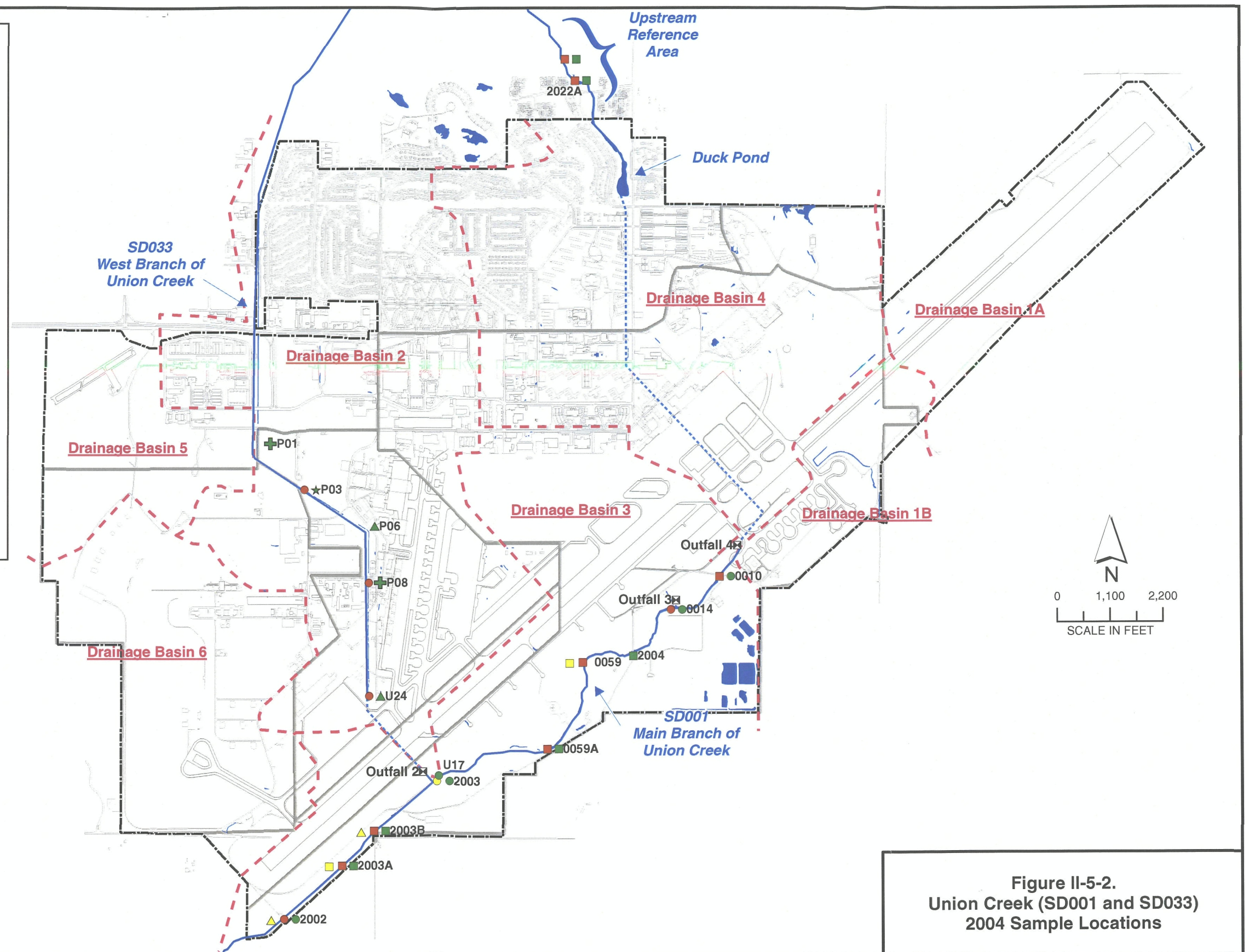


Figure II-5-2.
Union Creek (SD001 and SD033)
2004 Sample Locations

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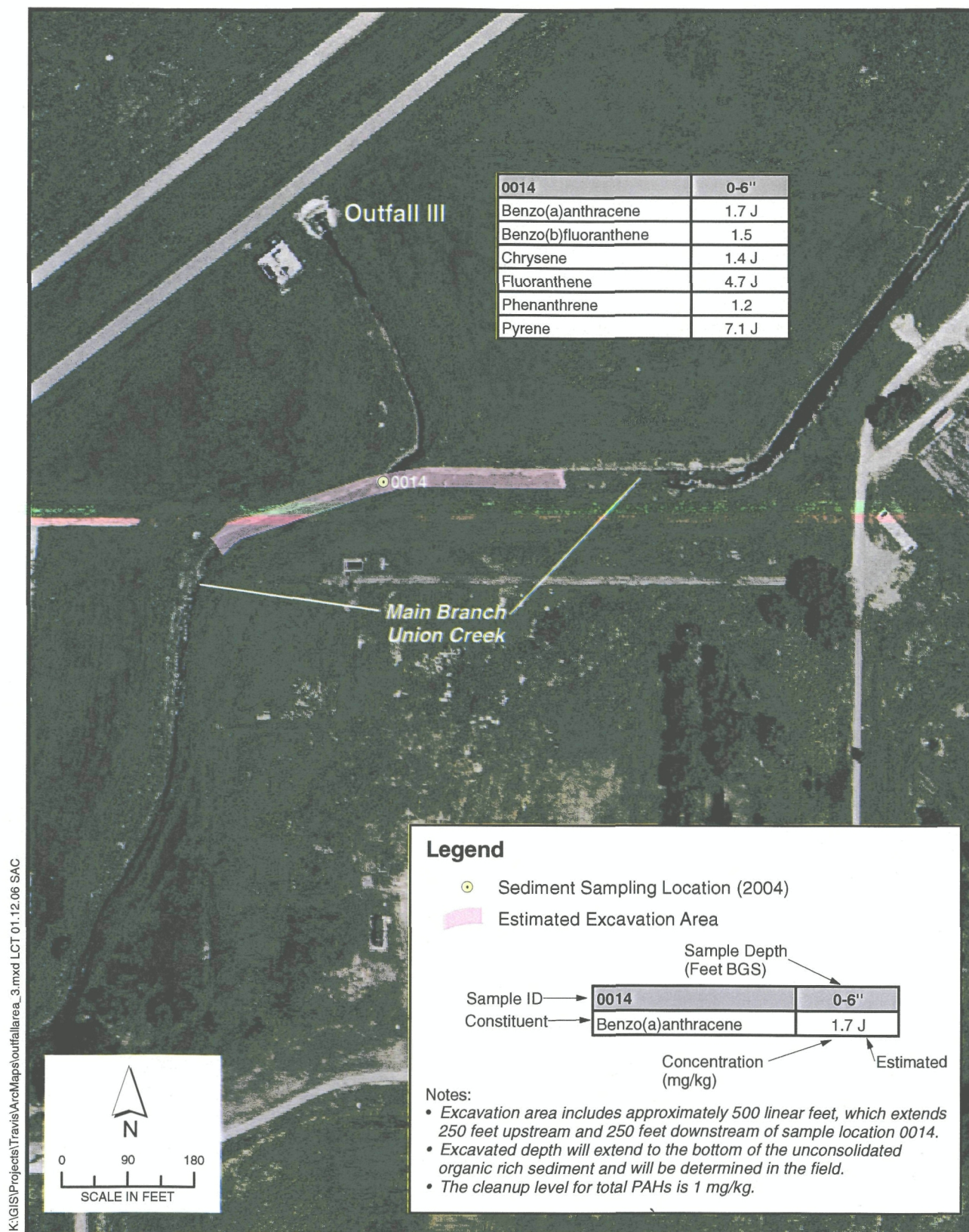


Figure II-5-3.
SD001 (Main Branch of Union Creek)
Estimated Excavation Area

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Table II-5-3

Cleanup Levels for Sediment COCs and COECs at SD001 (Main Branch of Union Creek)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern/ Contaminant of Ecological Concern	Sediment Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10 ⁻⁶ Cancer Risk ^a	Chronic HI=1	10 ⁻⁶ Cancer Risk ^a	Chronic HI=1		
Benzo(a)anthracene	Total	0.62	NE	2.1	NE	Total	No
Benzo(b)fluoranthene	PAHs=1	0.62	NE	2.1	NE	PAHs	No
Chrysene		62	NE	210	NE	=1 ^b	No
Fluoranthene		NE	2,300	NE	22,000		No
Phenanthrene		NE	NE	NE	NE		No
Pyrene		NE	2,300	NE	29,000		No

^a 10⁻⁶ equals 1/1,000,000. For example, 0.62 times 10⁻⁶ equals 0.00000062 and 2.1 times 10⁻⁶ equals 0.0000021^b A level of 1 mg/kg was agreed to be proactive of demersal fish, based on the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (NOAA SQT) (Buchman, 1999).

COC = contaminant of concern

NE = a value has not been established

COEC = contaminant of ecological concern

NEWIOU = North/East/West Industrial Operable Unit

HI = hazard index

PAH = polycyclic aromatic hydrocarbons

mg/kg = milligrams per kilogram

ROD = record of decision

NA = not applicable

TQ = toxicity quotient

implemented to address human health issues if concentrations of PAHs remaining in sediment after excavation exceed levels that allow for unlimited use and unrestricted exposure. The estimated excavation area for SD001 is shown on Figure II-5-3. The excavation will extend approximately 500 linear feet (from 250 feet upstream to 250 feet downstream of sample location 0014). The estimated volume of soil to be excavated is approximately 850 cubic yards. As agreed with the regulatory agencies, the excavation will not be backfilled (with gravel or soil). Habitat will be allowed to restore naturally, to provide suitable conditions for a variety of benthic and aquatic species. The estimated costs for the alternatives evaluated for SD001 are summarized in Table II-5-4.

Table II-5-4

Estimated Cost of Remedial Alternatives Evaluated for SD001 (Main Branch of Union Creek)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost (\$)
17 (Land Use Controls)	100,183 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	127,500 ^a
19 (Capping)	Not Evaluated ^b
20 (Excavation /Thermal Treatment)	510,000 ^c

^a Cost estimated based on the excavation of 850 cubic yards of soil at \$150/cubic yard, with all soils meeting CAMU acceptance criteria. The volume of soil to be excavated is estimated based on the following assumptions regarding excavation dimensions: 500-linear-foot length, 30-foot width, and 1.5-foot depth.^b Capping or paving the creek bed was not considered appropriate, and therefore was not evaluated.^c Thermal treatment cost estimated based on treating 850 cubic yards of soil at \$600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting ecological receptors. The following paragraphs provide additional details supporting the decisions for soil, sediment, and surface water at SD001.

Protection of Human Health—The following findings and conclusions with respect to soil and sediment contamination and the potential risks to human health were reached in the EIOU RI (Weston, 1995a) and in Appendix A of the Human Health Tech Memo.

The EIOU RI addressed the risk to a recreational user for surface water and sediment in Section 6.2.5.7 and concluded that the risks were less than 10^{-6} using the 1995 RI data. Union Creek sediment and surface water were sampled in 2004 to provide current data for an ERA. The results are included in the Eco Tech Memo and show that concentrations have substantially reduced since the RI. This change in concentrations probably results from a combination of improved pollution prevention practices at the Base, periodic dredging of the creek, groundwater source control (discussed below), and natural forces that affect sediment contamination and location. Based on this information, no action is necessary for Union Creek surface water for human health risk. Although the sediment is not a risk to recreational users, the contamination remaining after excavation may present a potential risk in a residential scenario. Therefore, land use controls will be implemented to address human health issues if concentrations of PAHs remaining in sediment after excavation exceed levels that allow for unlimited use and unrestricted exposure.

Source control (groundwater pump and treat) has been implemented under the WABOU and NEWIOU Groundwater IRODs to address migration of groundwater contaminated with VOCs (primarily TCE) to Union Creek. The groundwater extraction systems reduce the levels of contamination in the groundwater and, by lowering the water table, control the flow of groundwater into Union Creek and associated storm sewer systems. The levels of contamination in groundwater and surface water are monitored by the Base GSAP.

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at SD001 was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include aquatic plants, fish, benthic and aquatic invertebrates, birds, and mammals. The findings of the ERA, which are discussed in detail in Section 7.9 of the Eco Tech Memo, demonstrate that potential exposure to PAHs that may be present in sediment at sample location 0014 (shown on Figures II-5-2 and II-5-3) poses an unacceptable level of risk to juvenile fish. Excavation of sediment in this area of the creek is selected to address potential ecological issues at the site.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 2.0 of the Groundwater Protection Tech Memo.

The EIOU RI concluded that soil, sediment, or surface water contaminants do not contaminate groundwater at SD001; therefore, no soil, sediment, or surface water action is necessary for the protection of groundwater.

5.3.2 Fire Training Area 1 (FT002)

Site Description—Site FT002 consists of former Fire Training Area 1 (FTA-1) located in the northwestern portion of the EIOU at Travis AFB. This site was used for fire training exercises

from 1943 to 1950. Fuels used for the exercises consisted of waste fuels, oils, solvents, and other combustible wastes. Most contamination is attributed to runoff from the parking lots (leaded fuels and motor oils). Dormitories and parking lots that were present at the site during the RI in 1995 have since been removed. FT002 is currently an open grassy field. This summary presents information on contaminants in the soil at FT002.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations performed in the Human Health Tech Memo determined that soil contamination at the site does not pose a significant potential risk to current industrial workers or future residents based on industrial PRGs, residential PRGs, and the San Francisco Bay RWQCB ESLs. The Eco Tech Memo determined that no COPECs at FT002 were found to pose an unacceptable risk to ecological receptors. The Groundwater Protection Tech Memo determined that FT002 is not a source of contamination to the groundwater, and no soil remedial action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the no action decision for soil at FT002.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in the EIOU RI (Weston, 1995a) and in Appendix B of the Human Health Tech Memo.

Methylene chloride, lead, and TPH were the COCs identified at FT002. However, no action is selected for all COCs at FT002 because soil contamination at the site does not pose a significant risk to future residents. Methylene chloride concentrations exceed the residential PRG of 9.1 mg/kg in only one of 45 samples collected, and that concentration probably is related to laboratory contamination (Weston, 1995a). Lead concentrations in only 2 of 55 samples exceed the residential cleanup value of 146 mg/kg, which is the *DTSC Lead Risk Assessment Spreadsheet, Version 7* (Cal-EPA/DTSC, 1999) cutoff, where 99% of the child population studied remained below the blood-lead level of 10 milligrams per deciliter (mg/dL). In addition, only one of 55 samples exceeds the industrial cleanup level (800 mg/kg), and the maximum detected concentration (853 mg/kg) exceeds the industrial cleanup level by only approximately 6%. The maximum reported concentration of TPH extractable factor (TPH-E) (290 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg) (RWQCB, San Francisco Bay Region, 2004).

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at the site was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include terrestrial plants, soil invertebrates, birds, and mammals. The findings of the ERA, which are discussed in detail in Section 7.2 of the Eco Tech Memo, demonstrate that potential exposure to COPECs does not pose an unacceptable level of risk to ecological receptors that may be present. No action is necessary to address ecological issues at the site.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 3.0 of the Groundwater Protection Tech Memo.

The RI concluded that metals contamination in soil at FT002 is unlikely to cause groundwater contamination. Metals are not very mobile and have not migrated to groundwater. The COPEC di-n-butyl phthalate is confined to the surface; it has not leached to the subsurface and migrated

to groundwater. The COCs and COPECs identified at FT002 have been present since approximately 1943, when FTA-1 was in use, but they have not migrated to groundwater; therefore, these constituents are unlikely to do so. The RI concluded that FT002 is not a source of contamination to groundwater (Weston, 1995a). Therefore, no soil action is needed to protect groundwater.

5.3.3 Fire Training Area 2 (FT003)

Site Description—FT003, in the northeastern portion of the EIOU, is the former Fire Training Area 2 (FTA-2). The site was used for fire training exercises between 1950 and 1952. Waste fuels, oils, and solvents were dumped at the site and burned during fire training exercises. The site is predominantly open field. Approximately 20% of the site is paved, consisting of a concrete helicopter pad and paved access road. The open field is mowed regularly. Additional investigation was performed in 2001 to further delineate the lateral and vertical extent of PAH and PCB contamination at the site. This summary presents information on contaminants in the soil at FT003.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils with concentrations of PAHs and PCBs that pose a potential human health risk. Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of PAHs or PCBs remaining in soil after excavation do not allow for unlimited use and unrestricted exposure. Based on RI data, all excavated soil should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated soil that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

Evaluations performed in the Eco Tech Memo determined most of the identified COPECs (metals, PCBs, pesticides, or dioxins) do not pose a significant risk to ecological receptors. Although PAHs were found to pose an unacceptable level of risk to small mammals, soil cleanup levels protective of humans are lower than those protective of small mammals. Therefore, remedial actions taken to protect human receptors will also protect small mammals.

The Groundwater Protection Tech Memo determined no soil remedial action is necessary to protect groundwater.

Table II-5-5 presents the soil cleanup levels for the COCs at the site.

The Air Force will excavate the PAH- and PCB-contaminated soil based on soil cleanup levels in Table II-5-5. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete and land use controls will be necessary. The estimated excavation areas for FT003 are shown on Figure II-5-4. The estimated volume of soil to be excavated is approximately 1,080 cubic yards. The excavation will be backfilled with clean soil. The estimated costs for the alternatives evaluated for FT003 are summarized in Table II-5-6. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents.

Table II-5-5

Cleanup Levels for Soil COCs at FT003 (Fire Training Area 2)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10 ⁻⁶		10 ⁻⁵			
		Cancer Risk	Chronic HI=1	Cancer Risk	Chronic HI=1		
Aroclor-1248	0.74	0.22	NE	0.74	NE	NA	No
Benzo(a)anthracene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(a)pyrene	0.21	0.062	NE	0.21	NE	NA	No
Benzo(b)fluoranthene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(k)fluoranthene	21	6.2	NE	21	NE	NA	No
Dibenzo(a,h)anthracene	0.21	0.062	NE	0.21	NE	NA	No
Indeno(1,2,3-c,d)pyrene	2.1	0.62	NE	2.1	NE	NA	No

COC = contaminant of concern

HI = hazard index

mg/kg = milligrams per kilogram

NA = not applicable

NE = a value has not been established

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

TQ = toxicity quotient

Table II-5-6

Estimated Cost of Remedial Alternatives Evaluated for FT003 (Fire Training Area 2)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost (\$)
17 (Land Use Controls)	112,706 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	147,770 (from the Remedial Design)
19 (Capping)	765,900 ^a
20 (Excavation /Thermal Treatment)	648,000 ^b

^a Capping cost estimated based on 85,100 square feet of cap at \$9/square foot.^b Thermal treatment cost estimated based on treating 1,080 cubic yards of soil at \$600/cubic yard. This includes the cost of soil excavation.

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

The following paragraphs provide additional details supporting the decision for excavation of PAH- and PCB-contaminated soil that pose a potential risk to human receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix C of the Human Health Tech Memo.

During the RI, the potential COCs identified for FT003 included PCBs, PAHs, metals, TPH, and dioxins. However, only cleanup of soil contaminated with PAHs and PCBs (that pose a potential risk to human receptors) is considered necessary for the protection of human receptors. Although dioxins, metals, and TPH were identified as potential COCs for human

health during the RI, these compounds will not be remediation drivers for the site. Dioxins were detected in soil at the site but with a low detection frequency and low concentration. (Note: Dioxins/furans exist in a number of different forms [congeners].) Each of these congeners is more or less toxic than the others. To simplify reporting, all of the different congeners are converted into an equivalent amount of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) using toxicity equivalence factors developed by U.S. EPA, and the total amount of dioxins/furans is reported as 2,3,7,8-TCDD(eq). All 2,3,7,8-TCDD(eq) were less than the industrial PRG, and no action is considered necessary for this compound. Arsenic concentrations detected were similar to background levels and were considered to pose an acceptable risk to human receptors. The maximum reported concentration of TPH-E (660 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo determined that of the identified COPECs (metals, PCBs, pesticides, dioxins, or PAHs), only PAHs pose a significant risk to ecological receptors. However, remedial actions implemented to protect human receptors will adequately protect ecological receptors, and no further action for ecological receptors is necessary. Metals concentrations detected were similar to background levels, and no action is considered necessary for PCBs, pesticides, and dioxins. Additional details on the ERA are provided in Section 7.3 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 4.0 of the Groundwater Protection Tech Memo.

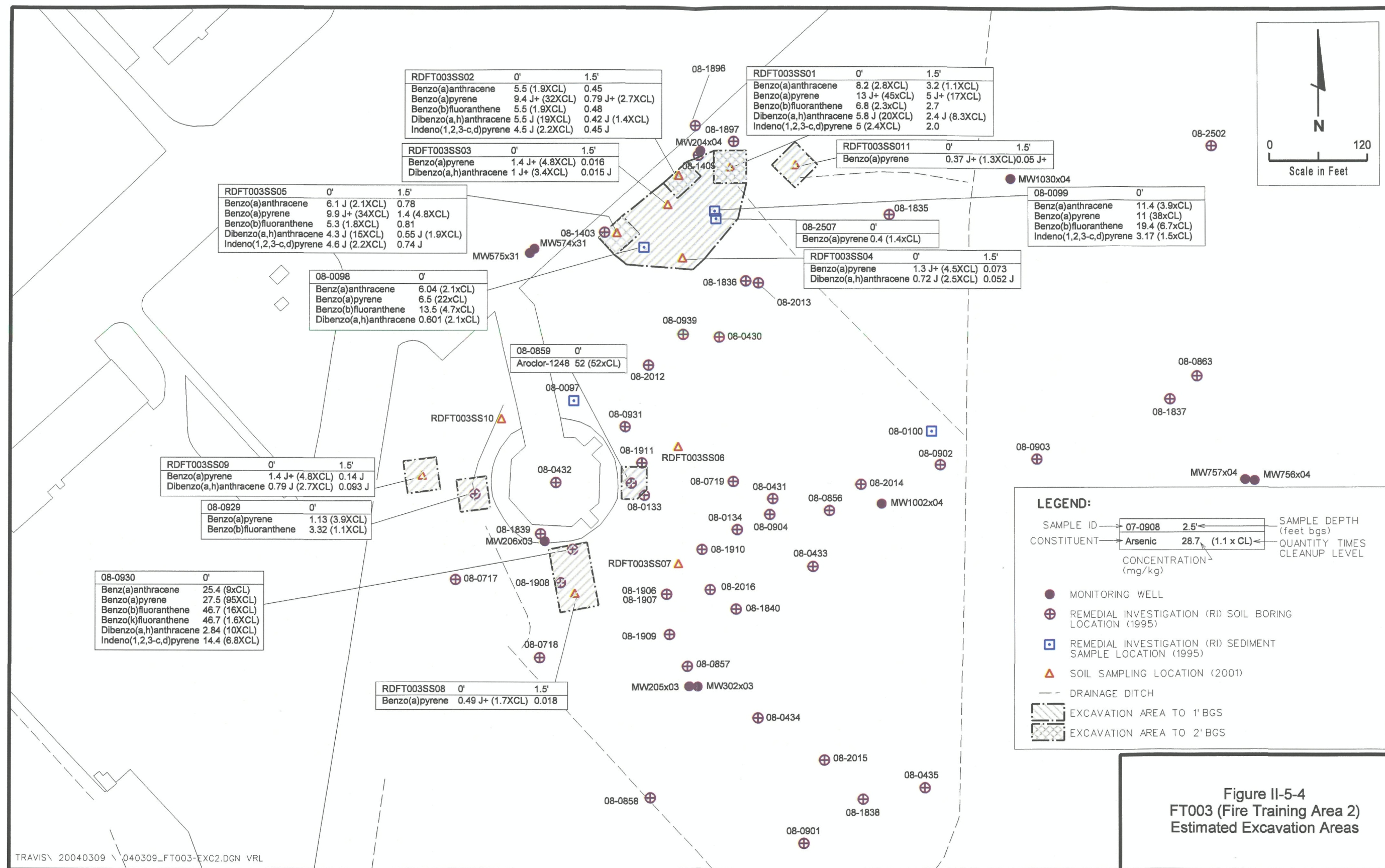
Soil contamination reported at FT003 during the RI was primarily in surface soil. Because the contaminants have not leached to the subsurface during the time since 1952, when FT003 was last used as a fire training area, the contaminants are unlikely to migrate to groundwater. Any TPH-E that remains in surface soil is unlikely to migrate to groundwater before being naturally attenuated in the soil. It was concluded in the RI that soil at FT003 is not a source of groundwater contamination. Therefore, no soil remedial action is necessary to protect groundwater.

5.3.4 Fire Training Area 3 (FT004)

Site Description—FT004 covers approximately 30 acres in the northeastern portion of the EIOU and is the former Fire Training Area 3 (FTA-3). The site was used for fire training exercises from 1953 until 1962. Approximately 25 55-gallon drums of waste fuels, oils, and solvents were delivered to the site weekly. The drums were emptied, and the contents were ignited and subsequently extinguished. The site is now an unused open field with less than 10% paved area. This summary presents information on contaminants in the soil at FT004.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils with concentrations of dioxins that pose a potential human health risk and for soils with concentrations of lead above 77 mg/kg that pose a threat to ecological receptors. Alternative 17 (Land Use Controls) is the selected contingency remedial action if dioxin concentrations remaining in soil after excavation do not allow for unlimited use and unrestricted exposure. Based on RI data, all excavated soil should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated soil that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

The Groundwater Protection Tech Memo determined that a current groundwater extraction system is capturing contaminated groundwater and that no soil remedial action is necessary to protect groundwater.



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Table II-5-7 presents the soil cleanup levels for the COC and COEC at the site.

The Air Force will excavate the dioxin- and lead-contaminated soil based on the soil cleanup levels in Table II-5-7. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete and whether land use controls will be necessary. The estimated excavation area for FT004 is shown on Figure II-5-5.

Table II-5-7

Cleanup Levels for Soil COC and COEC at FT004 (Fire Training Area 3)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern/ Contaminant of Ecological Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Ground-water Impact?
		10 ⁻⁶ Cancer Risk	Chronic HI=1	10 ⁻⁶ Cancer Risk	Chronic HI=1		
Lead	77 ^a	NE	400 150 ^b	NE	800	77 ^a	No
2,3,7,8-TCDD(eq) ^c	0.000016 ^c	0.0000039	NE	0.000016 ^c	NE	NA	No

^a The cleanup level is based on the evaluation performed in the Eco Tech Memo and risk management negotiations with the agencies and was determined to be the cleanup goal.

^b California Modified PRG.

^c Equivalency factors for the maximum reported concentration and cleanup level listed for 2,3,7,8-TCDD equivalency address the human risk equivalency.

COC = contaminant of concern

COEC = contaminant of ecological concern

HI = hazard index

mg/kg = milligrams per kilogram

NA = not applicable

NE = a value has not been established

NEWIOU = North/East/West Industrial Operable Unit

PRG = preliminary remediation goal

ROD = record of decision

TCDD(eq) = tetrachlorodibenzo-p-dioxin equivalent

TQ = toxicity quotient

The estimated volume of soil to be excavated is approximately 1,940 cubic yards. The excavation will be backfilled with clean soil. The estimated costs for the alternatives evaluated for FT004 are summarized in Table II-5-8. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents and current ecological receptors.

The following paragraphs provide additional details supporting the decision for excavation of dioxin-contaminated soils that pose a potential risk to human receptors and lead-contaminated soils that pose a risk to ecological receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix D of the Human Health Tech Memo.

Dioxins and TPH were identified as potential COCs for FT004. However, only cleanup of soil contaminated with dioxins (which pose a potential risk to human receptors) is considered

Table II-5-8

Estimated Cost of Remedial Alternatives Evaluated for FT004 (Fire Training Area 3)
 North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost (\$)
17 (Land Use Controls)	113,166 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	291,000 ^a
19 (Capping)	456,300 ^b
20 (Excavation /Thermal Treatment)	1,164,000 ^c

^a Cost estimated based on the excavation of 1,940 cubic yards of soil at \$150/cubic yard, with all soils meeting CAMU acceptance criteria.

^b Capping cost estimated based on 50,700 square feet of cap at \$9/square foot.

^c Thermal treatment cost estimated based on treating 1,940 cubic yards of soil at \$600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit

NEWIOU = North/East/West Industrial Operable Unit

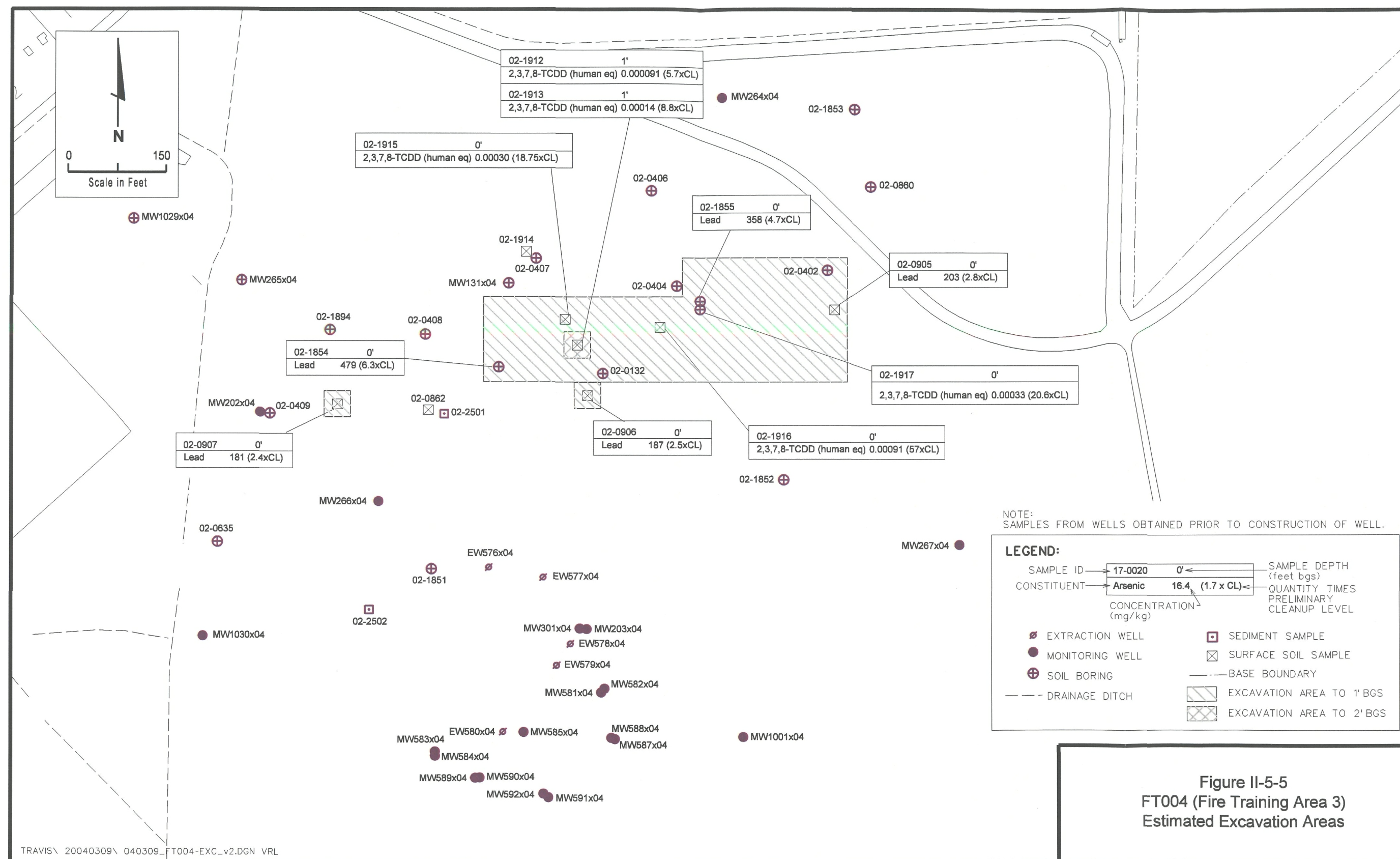
ROD = record of decision

necessary for the protection of human receptors (for the industrial scenario). Dioxin concentrations in 7 of the 11 RI soil samples collected exceeded residential PRGs, and concentrations in 5 of the 11 soil samples exceeded industrial PRGs, posing an unacceptable potential risk to site workers and future residents. No action is necessary for TPH contamination. The maximum reported concentration of TPH-E (980 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo determined that concentrations of lead at locations 02-1854, 02-1855, 02-0905, 02-0906, and 02-0907 were above the site-specific background level of 61 mg/kg, which is greater than the lowest Tier 1 CTV (calculated for the ornate shrew). Therefore, the background level multiplied times a 25% margin of error (77 mg/kg) was identified as the cleanup level to protect the most sensitive ecological receptors. Remediation is warranted at the five locations with concentrations above the selected cleanup level. The evaluation also determined dioxin concentrations in soil and small mammal tissues pose an unacceptable level of risk to ecological receptors. However, remedial actions implemented to protect human receptors will adequately protect ecological receptors, and no further action is necessary to protect ecological receptors potentially exposed to dioxins at FT004. Additional details regarding the results of the ERA for FT004 are provided in Section 7.4 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 5.0 of the Groundwater Protection Tech Memo.

The RI concluded that, while VOCs in soil may have been a source of VOC groundwater contamination at FT004 in the past, they are not currently a source. The RI also concluded that contamination in soil was not a source of metals concentrations in groundwater. Dioxins were reported primarily in surface soil, at depths above 1 foot bgs, and have not leached to the subsurface since approximately 1962, when FT004 was in use as a fire training area. Thus, dioxins are unlikely to migrate to groundwater in the future.



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The FT004 extraction well system is currently extracting groundwater contaminated with VOCs. Eight FT004 extraction wells are capturing all groundwater with VOC concentrations that exceed MCLs. TPH that remains in soil is likely to naturally attenuate before reaching groundwater. In addition, if TPH were to migrate to groundwater, it would be captured by the existing extraction system. These factors indicate that the groundwater at FT004 is protected; thus, no soil remedial action is necessary to protect groundwater.

5.3.5 Fire Training Area 4 (FT005)

Site Description—FT005 covers approximately 30 acres in the southeastern portion of the EIOU. The site includes the former Fire Training Area 4 (FTA-4) used for fire training exercises from 1962 through approximately 1987. Aerial photographs indicate that the area may have been used for munitions storage prior to 1958. From 1962 until the early 1970s, waste fuels, oils, and solvents were burned at the site during training exercises. From the early 1970s until 1987, only waste fuels were burned at the site. A 25,000-gallon AST was installed in 1976 to hold the waste fuels, and it is still located at the site. From 1990 to 1994, the northern portion of the area was used as a dump site for miscellaneous waste, such as concrete, fencing, and street sweepings. Additional investigation was performed in 2001 to further delineate the lateral and vertical extent of PAH and PCB contamination at the site. This summary presents information on contaminants in the soil at FT005.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils with concentrations of PAHs that pose a potential human health risk. Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of PAHs, PCBs, TPH, or dioxins remaining in soil after excavation do not allow for unlimited use and unrestricted exposure. Based on RI data, all excavated soil should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated soil that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

Evaluations performed in the Eco Tech Memo determined PAHs were found to pose an unacceptable level of risk to small mammals. However, soil cleanup levels protective of humans are lower than those protective of small mammals. Therefore, remedial actions taken to protect human receptors will also protect small mammals. The Groundwater Protection Tech Memo determined that no soil remedial action is necessary to protect groundwater.

Table II-5-9 presents the soil cleanup levels for the COCs at the site.

The Air Force will excavate the PAH-contaminated soil based on the soil cleanup levels in Table II-5-9. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete and whether land use controls will be necessary. The estimated excavation areas for FT005 are shown on Figure II-5-6. The estimated volume of soil to be excavated is approximately 2,490 cubic yards. The excavation will be backfilled with clean soil. The estimated costs for the alternatives evaluated for FT005 are summarized in Table II-5-10. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents and current ecological receptors.

Table II-5-9

Cleanup Levels for Soil COCs at FT005 (Fire Training Area 4)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10 ⁻⁶ Cancer Risk	Chronic HI=1	10 ⁻⁶ Cancer Risk	Chronic HI=1		
Benzo(a)anthracene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(a)pyrene	0.21	0.062	NE	0.21	NE	NA	No
Benzo(b)fluoranthene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(k)fluoranthene	21	6.2	NE	21	NE	NA	No
Dibenzo(a,h)anthracene	0.21	0.062	NE	0.21	NE	NA	No
Indeno(1,2,3-c,d)pyrene	2.1	0.62	NE	2.1	NE	NA	No
COC = contaminant of concern			NE	= a value has not been established			
HI = hazard index			NEWIOU	= North/East/West Industrial Operable Unit			
mg/kg = milligrams per kilogram			ROD	= record of decision			
NA = not applicable			TQ	= toxicity quotient			

Table II-5-10

Estimated Cost of Remedial Alternatives Evaluated for FT005 (Fire Training Area 4)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost (\$)
17 (Land Use Controls)	139,740 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	373,500 ^a
19 (Capping)	1,555,200 ^b
20 (Excavation /Thermal Treatment)	1,494,000 ^c

^a Cost estimated based on the excavation of 2,490 cubic yards of soil at \$150/cubic yard, with all soils meeting CAMU acceptance criteria.

^b Capping cost estimated based on 172,800 square feet of cap at \$9/square foot.

^c Thermal treatment cost estimated based on treating 2,490 cubic yards of soil at \$600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit

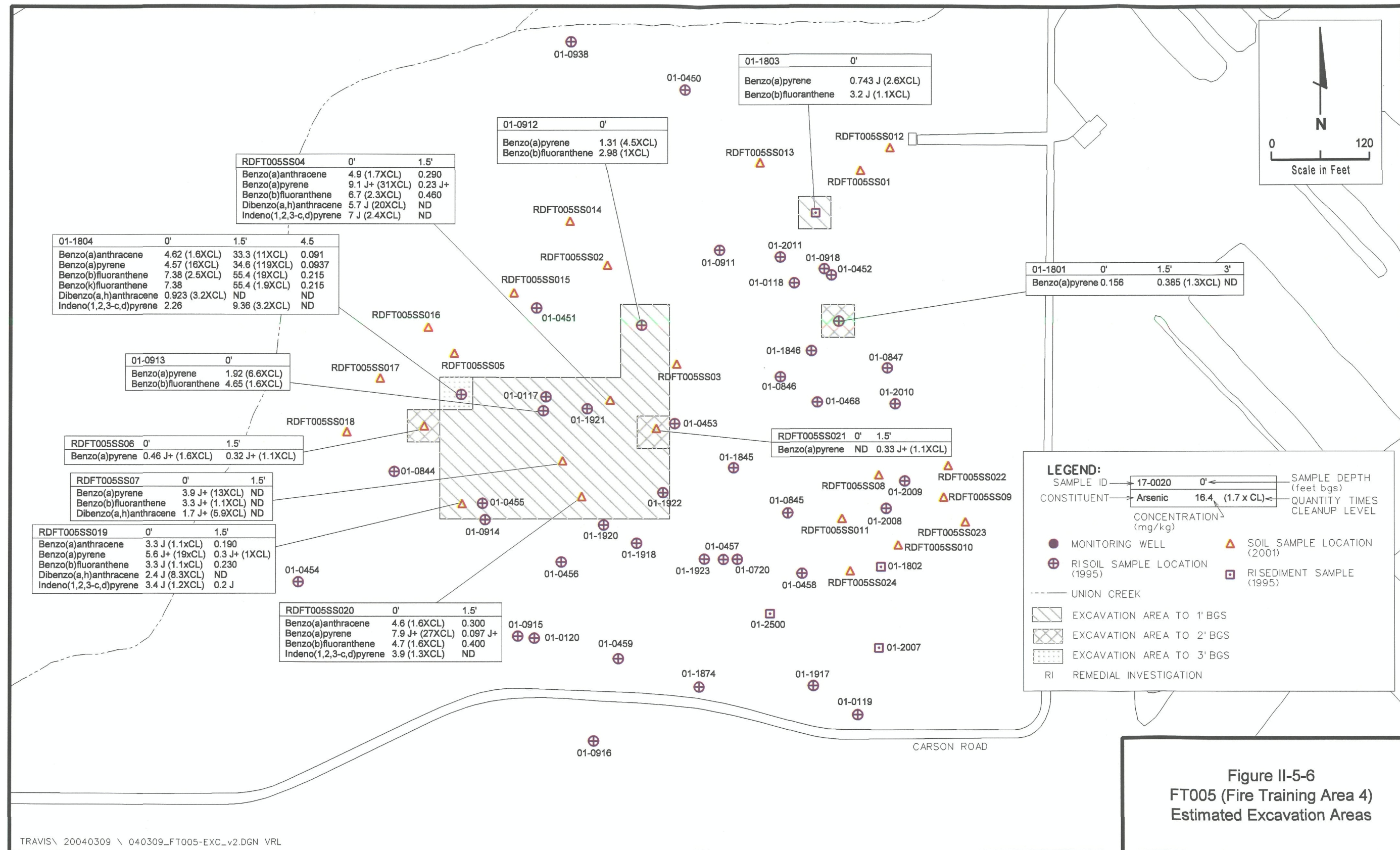
NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

The following paragraphs provide additional details supporting the decision for excavation of PAH-contaminated soil that poses a potential risk to human receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix E of the Human Health Tech Memo.

During the RI, the potential COCs identified for FT005 included: PAHs, PCBs, dioxins, metals, VOCs, and TPH. However, only cleanup of soil contaminated with PAHs (which pose a potential human health risk) is considered necessary for the protection of human receptors. Although PCBs, dioxins, metals, and VOCs were identified as potential COCs for human health during the RI, these compounds will not be remediation drivers for the site. Alternative 17



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(Land Use Controls) is the selected contingency remedial action if concentrations of PCBs and dioxins remaining in soil after excavation exceed levels that allow for unlimited use and unrestricted exposure. PCB concentrations in only 1 of 95 RI samples (at location 01-2008) exceeded industrial PRGs (0.74 mg/kg), and residential PRGs (0.22 mg/kg) were exceeded at 2 sample locations (01-2008 and 01-1802). Dioxins were detected in RI soil samples; all 2,3,7,8-TCDD(eq) were less than industrial PRGs. However, residential PRGs were exceeded at three surface sample locations and two composite sample locations.

No action is necessary for metals because all concentrations reported (except those for selenium) could be natural variations of background. An exception may be one detected concentration of barium of 1,940 mg/kg (4.4 times background). This result, and all detected concentrations of selenium, are from locations that will be excavated during the proposed excavation of soil posing a human health risk.

No action is necessary for VOCs in soil because only 1 ethylbenzene result out of 99 and 1 total xylenes result out of 88 pose a risk to human health. In addition, these hits were detected at 12 feet bgs; therefore, exposure to these analytes is unlikely.

Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of TPH remaining in the soil after excavation do not allow for unlimited use and unrestricted exposure. The maximum reported concentration of TPH-E is 670 mg/kg and of TPH is 16,000 mg/kg, which exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg). However, the Air Force and regulatory agencies have agreed that the TPH-contaminated soil at FT005 will naturally attenuate, and some of the TPH-contaminated soil will be removed as a result of the proposed excavation of soil posing a human health risk. Alternative 17 will be applied unless it can be shown that post-excavation concentrations of TPH are less than the 2,300 mg/kg screening level. LUCs as a result of TPH concentrations will remain in place until concentrations attenuate to less than 2,300 mg/kg.

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo identified PAHs as a potential risk to small mammals. However, cleanup levels protective of human receptors will also protect small mammals, and no further action is required. No other COPECs were identified for risk management at the site. Additional details regarding the results of the ERA for FT005 are provided in Section 7.5 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 6.0 of the Groundwater Protection Tech Memo.

During the RI, the soil was tested for VOCs, but none was detected. Therefore, any past VOC mass from soil has most likely migrated to groundwater and/or volatilized into the air. No action is necessary for VOCs in soil to protect groundwater.

TPH that remains in vadose zone soil probably will naturally attenuate. In addition, a groundwater extraction system that captures contaminated groundwater flowing from FT005 is active at the site. Therefore, no action for TPH in soil is necessary to protect groundwater.

Metal, PAH, and PCB concentrations in soil that pose a threat to human health were not detected in groundwater in 1995, when the RI was performed; therefore, the metals, PAHs, and PCBs are unlikely to migrate to groundwater in the future. In addition, if any contaminants

were to migrate to groundwater, they would be captured by the groundwater extraction system. Therefore, no soil remedial action is necessary to protect groundwater.

5.3.6 Landfill 2, Areas B, C, D, E, and G (LF007)

Site Description—LF007, at Landfill 2, occupies approximately 73 acres in the NOU. The landfill was operated in a trench-and-cover manner beginning in the early 1950s, following the closure of Landfill 1. The landfill was used primarily for the disposal of general refuse, such as wood, glass, and construction debris. Small amounts of industrial wastes and fuel sludge from tank cleaning operations also were reported to have been disposed of at Landfill 2 (Radian, 1995). The use of Landfill 2 ceased in 1974. From the early 1950s until 1964, a portion of the eastern part of the landfill was used to store excess and waste materials, including oils, hydraulic fluid, and solvents, for resale or disposal. As determined by aerial photographs, a skeet range also was located at the site in approximately 1953; however, the exact dates of operation are not known (Radian, 1995). Current operations at the site are limited to those conducted at Buildings 1360, 1365, 1370, and the CAMU. Building 1360 is the Affiliate Radio System; Building 1365 is used for hazardous waste storage; and Building 1370 houses the Small Arms Range.

During the NOU RI, soil contamination was found in four areas of the site, which are referred to as Areas B, D, E, and G (see Figure II-5-7). Groundwater contamination was identified in these areas and in Area C. Landfill and backfill material occur to 15 feet bgs in Areas B and D. Layers of clay and silt are present from the surface to bedrock. Bedrock occurs at a depth of 0 to 40 feet bgs, depending on the location in LF007. Groundwater is encountered between 1 and 25 feet bgs and flows radially from the site. This summary presents information on contaminants in the soil at LF007.

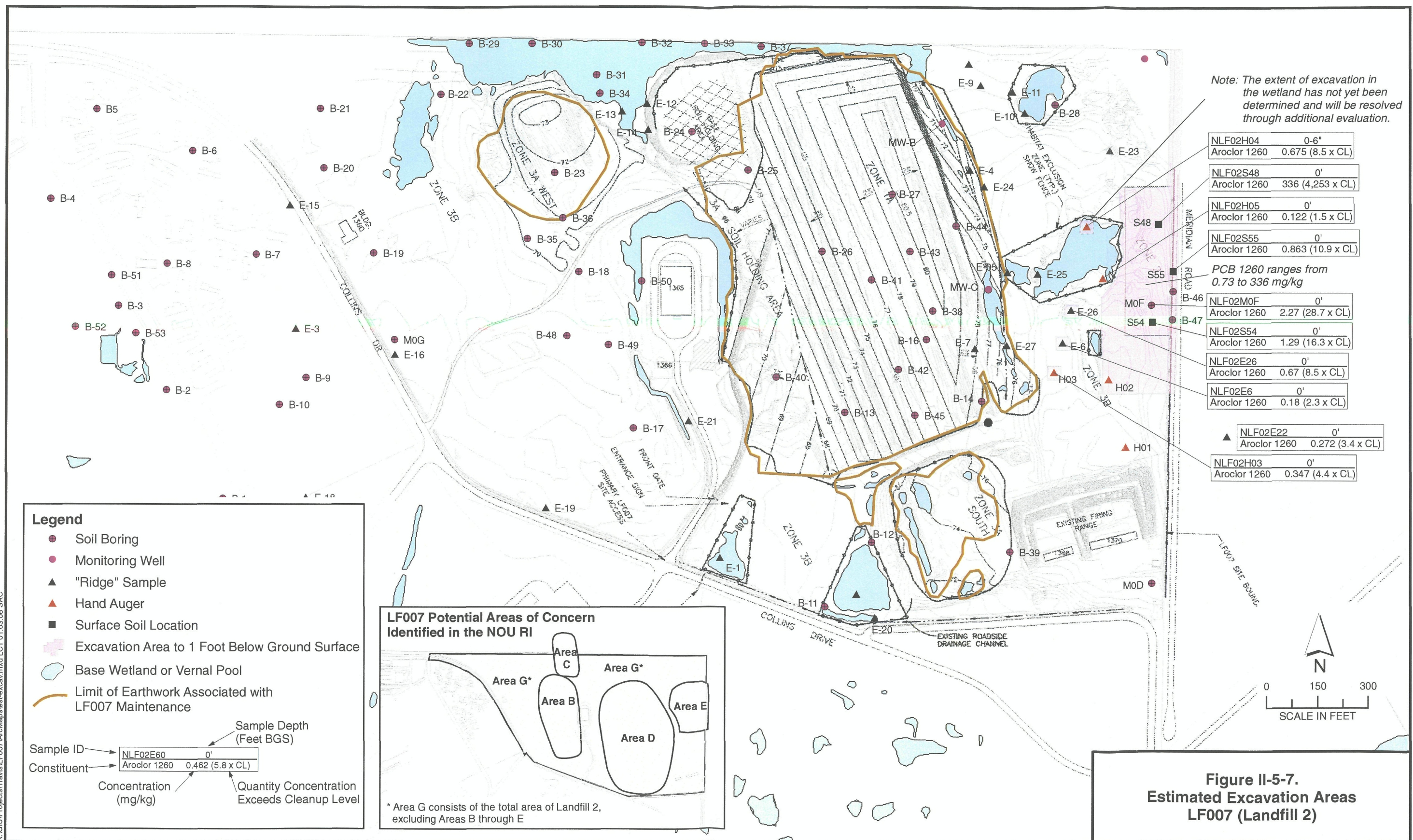
Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils in Area E, with concentrations of PCBs (Aroclor-1260) that pose a potential human health risk and a potential ecological risk. In addition, Alternative 17 (Land Use Controls) is the selected remedial action for LF007 for sample location E19, the CAMU cover, CAMU-associated features, and the Landfill 2 cover and associated buried wastes.

The Groundwater Protection Tech Memo determined that no soil remedial action is necessary to protect groundwater.

Table II-5-11 presents the soil cleanup level for the COC and COEC at the site.

The Air Force will excavate the PCB-contaminated soil from locations shown on Figure II-5-7 based on the soil cleanup level in Table II-5-11. Aroclor-1260 was found at elevated concentrations in several locations within vernal pools and seasonal wetlands at LF007 that reside outside of the boundary of the proposed remedial action area. However, remediation in these sensitive habitats will be avoided to the extent reasonable. Additional investigation will be performed to determine whether or not special status invertebrates are present in the pools and wetlands. Current concentrations of Aroclor-1260 in sediments of these habitats will also be measured and, if confirmed to be elevated, the capacity of the sediments to elicit adverse effects in benthic invertebrates will be assessed (i.e., toxicity tests). The additional evaluation of Aroclor-1260 at LF007 will be presented in a technical memorandum or in the remedial design for this site; it has already been determined that excavation will be the selected remedy at LF007. The extent of

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Table II-5-11

Cleanup Levels for Soil COC and COEC at LF007 (Base Landfill 2)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern/ Contaminant of Ecological Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10 ⁻⁶ Cancer Risk	Chronic HI=1	10 ⁻⁶ Cancer Risk	Chronic HI=1		
Aroclor-1260	0.079	0.22 ^a	NE	0.74	NE	0.079	No

^a For excavation areas outside the Base boundary, soil will be excavated so that the remaining contamination will not pose a risk to future residents (based on residential PRGs).

COC = contaminant of concern

COEC = contaminant of ecological concern

HI = hazard index

mg/kg = milligrams per kilogram

NE = a value has not been established

NEWIOU = North/East/West Industrial Operable Unit

PRG = preliminary remediation goal

ROD = record of decision

TQ = toxicity quotient

excavation will be established based on the results of the additional data collection and subsequent discussions with the appropriate agencies.

Following excavation, confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. The estimated excavation areas are shown on Figure II-5-7. The estimated volume of soil to be excavated is approximately 9,500 cubic yards. This estimate does not include any additional soil that may be excavated from within vernal pools or the seasonal wetland at LF007. The excavation areas (excluding the areas within vernal pools or wetlands) will be backfilled with clean soil. Areas within the vernal pools will be restored in accordance with guidance from the appropriate regulatory agencies. The estimated costs for the alternatives evaluated for Area E in LF007 are summarized in Table II-5-12.

Table II-5-12

Estimated Cost of Remedial Alternatives Evaluated for LF007 (Landfill 2) Area E

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost (\$)
17 (Land Use Controls)	165,600 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	1,425,000 ^a
19 (Capping)	2,250,000 ^b
20 (Excavation /Thermal Treatment)	5,700,000 ^c

^a Cost estimated based on the excavation of 9,500 cubic yards of soil at \$150/cubic yard, with all soils meeting CAMU acceptance criteria.

^b Capping cost estimated based on 250,000 square feet of cap at \$9/square foot.

^c Thermal treatment cost estimated based on treating 9,500 cubic yards of soil at \$600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents and current ecological receptors. These costs do not include the added expense of soil excavation in vernal pools or wetlands and habitat restoration.

The following paragraphs provide additional details supporting the decision for excavation of PCB-contaminated soil that poses a potential risk to human receptors in Area E and PCB-contaminated soil and sediment that pose a potential risk to ecological receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix F of the Human Health Tech Memo.

During the NOU RI (Radian, 1995), the potential COCs identified for LF007 were PCBs, PAHs, metals, and TPH. Soil contamination was found in four locations (Areas B, D, E, and G). COCs in soil at Area B include PAHs and TPH; COCs in soil at Area D include PCBs, TPH, and metals; Area E COCs include PCBs, metals, and TPH; and Area G, the remaining portion of the landfill, is contaminated with metals and, in one location (E19), with PCBs. However, only cleanup of soil contaminated with PCBs (that pose a potential risk to human receptors) in Area E is considered necessary for the protection of human receptors.

In Area E, concentrations of PCBs range from less than the detection limit to 336 mg/kg, which is greater than the industrial and residential PRGs and poses an ecological risk. The high levels of PCBs warrant excavation and the reduction of potential risk. Soil from this area will be excavated until there is no longer a risk to human receptors because the ecological based cleanup level is less than the residential PRG. Excavation in this area also will remove elevated levels of arsenic (33.4 mg/kg) at sample location NLF02M0F. Samples collected on the eastern Base boundary, outside of the fence, in the ditch along Meridian Road, had PCBs with concentrations ranging from 0.73 mg/kg to 3.1 mg/kg, which is greater than residential PRGs. Contaminated soil in this area will be excavated so that no unacceptable risk to future residents remains.

The CAMU has been designed and constructed at Area D; therefore, the PCB and metals contamination will be capped. In addition, LUCs have been implemented for the CAMU cover, CAMU-associated features, and the Landfill 2 cover and associated buried wastes. Land use controls also will be put in place for the PCB contamination at location E19 unless the Air Force decides to excavate this area to levels allowing unrestricted use during fieldwork. At E19, the Aroclor-1260 concentration of 1.02 mg/kg is only 1.4 times the preliminary cleanup level of 0.74 mg/kg.

The Human Health Tech Memo determined that no action is necessary for metals in soil that pose a potential risk to human receptors outside of Area E because all concentrations reported are likely natural variations of background. No action is necessary for TPH. The Air Force and regulatory agencies have agreed that the TPH-contaminated soil at LF007 will naturally attenuate. In addition, only one sample of TPH-E (4,300 mg/kg) exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg); this sample is in the area covered by the LUCs specified above for the CAMU cover, CAMU-associated features, and the Landfill 2 cover and associated buried wastes. The Human Health Tech Memo also determined that no action is necessary for PAHs because the small area of PAH contamination does not pose an unacceptable risk.

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo determined that concentrations of Aroclor-1260 at sample locations S-48, S-54, S-55, B-46, B-47, M-0F, H-02, H-03, E-6, and E-26 pose a potential risk to the western meadowlark and should be remediated. No other COPECs were identified for risk management at the site. Additional details regarding the results of the ERA for FT005 are provided in Section 7.6 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 7.0 of the Groundwater Protection Tech Memo.

PAHs were reported at Area B in surface soil; however, PAHs were not detected in subsurface soil. Because PAHs had not leached into the vadose zone from the time the landfill was operated in the early 1950s to the time of the RI in 1994, the PAHs are not likely to migrate to groundwater. Therefore, no soil action is necessary to protect groundwater from PAH contamination at Area B.

No soil contamination was identified in Area C. The source of TCE in groundwater is unknown. Most of the mass of VOCs that migrated through soil and contaminated groundwater at Area C has probably entered soil gas, the atmosphere, or groundwater and has left little residual in soil.

Area D is the soil site in the NEWIOU that has been selected as the location for the CAMU (Radian, 2001). PCB was identified as both a soil and groundwater COC beneath Area D during the RI. However, it was detected in groundwater because PCBs were placed in landfill trenches that were dug to depths that were below the water table during the wet season, directly causing groundwater contamination. PCB concentrations reported from soil samples (0.986 mg/kg maximum) are below the estimated screening level of 6.3 mg/kg, which indicates that the PCBs in soil above the water table are unlikely to migrate to groundwater. Groundwater will continue to be monitored to ensure that PCBs below the groundwater are not migrating. PAHs were identified in soil in Area D; however, PAHs have not leached to groundwater. In addition, maximum concentrations of PAHs in soil (benzo[a]pyrene at 0.55 mg/kg, benzo[b]fluoranthene at 1.12 mg/kg, and dibenzo[a,h]anthracene at 0.03 mg/kg) are more than 2 orders of magnitude below ESLs (benzo[a]pyrene at 130 mg/kg, benzo[b]fluoranthene at 640 mg/kg, and dibenzo[a,h]anthracene at 140 mg/kg), indicating that they are unlikely to migrate to groundwater. Therefore, no soil action is necessary to protect groundwater beneath Area D.

Although concentrations of PCBs in Area E soil range from less than the detection limit to 336 mg/kg, PCBs were not detected in groundwater. Arsenic also was reported in Area E at a maximum concentration of 33.4 mg/kg, which is approximately 2.5 times the background concentration in soil (14 mg/kg). However, it was not detected in groundwater or identified as a COC. Because of the immobility of PCBs and arsenic in this location, no soil action is necessary to protect groundwater from PCB contamination at Area E.

Concentrations of metals reported in Area G (outside of Areas B, D, and E) were not identified as COCs in groundwater at LF007. Metals were detected in groundwater; however, the greater concentrations of the metals in subsurface soil do not occur in the same borings in which the greater concentrations in groundwater occur. Furthermore, the greater concentrations of the metals in surface soil do not occur in the same locations as those in subsurface soil. Aroclor-1260 was reported in only one surface soil sample in Area G at a concentration (1.02 mg/kg) that exceeds the industrial PRG of 0.74 mg/kg. Because of the limited extent, in shallow soil only,

metals or PCBs are unlikely to migrate to groundwater. No soil action for metals or PCBs is necessary at Area G to protect groundwater.

No action to protect groundwater is necessary for TPH in soil because less than 11% of the samples are above screening levels, and TPH will naturally attenuate.

5.3.7 Sludge Disposal Site (OT010)

Site Description—OT010 is a 16-acre area in an inactive area in the southeastern portion of the EIOU. Historically, the site was reportedly used for sewage sludge disposal in the fields northeast and southwest of the sewage treatment plant, though this was not confirmed, and no source area was identified. The sewage treatment plant was in use from the 1950s to the late 1970s. Currently, a sewage lift station and overflow ponds exist at the site. This summary presents information on contaminants in the soil at OT010.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a significant risk to future residents based on the residential PRGs, inorganic reference concentrations, and the San Francisco Bay RWQCB ESLs for TPH. The Eco Tech Memo determined that no COPECs at this site pose an unacceptable risk to ecological receptors. The Groundwater Protection Tech Memo determined that no soil remedial action is necessary at OT010 to protect groundwater.

The following paragraphs provide additional details supporting the decision for no soil action at OT010.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix G of the Human Health Tech Memo.

Arsenic and TPH were the COCs identified at OT010. However, no action is selected for all COCs at OT010 because soil contamination at the site does not pose an unacceptable risk to site workers or future residents. The arsenic concentration in only 2 of 24 samples (25.6 mg/kg and 52.1 mg/kg) exceeds the inorganic reference concentration for surface soil of 14 mg/kg (from Table 7-1 in the WIOU RI [Radian, 1996a]). Both results were J flagged, and the 52.1 mg/kg result was from an early round of RI data that were relegated to screening level data (not to be used for risk assessment) due to quality validation issues. The maximum reported concentration of TPH-E (470 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at OT010 was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include terrestrial plants, soil invertebrates, birds, and mammals. The findings of the ERA demonstrate that potential exposure to COPECs does not pose an unacceptable level of risk to ecological receptors that may be present. No action is necessary to address ecological issues at the site. Additional details regarding the results of the ERA for OT010 are provided in Section 7.7 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 8.0 of the Groundwater Protection Tech Memo.

The RI concluded that contaminated soil at OT010 is not a source of groundwater contamination. TPH that remains in soil is likely to naturally attenuate before reaching groundwater. In addition, if TPH were to migrate to groundwater, it would be captured by the existing extraction system. Groundwater downgradient from OT010 is monitored as a part of the FT005 groundwater extraction system. These factors indicate that the groundwater at OT010 is protected; thus, no soil remedial action is necessary to protect groundwater.

5.3.8 Solvent Spill Area and Facilities 550 and 552 (including area at Facility 1832) (SS015)

Site Description—SS015 is in the northwestern part of the EIOU and consists of the SSA and Facilities 550 and 552. The SSA covers approximately 1.4 acres east of Facility 550 in an area previously used for stripping paint from aircraft. The site was an open, grassy plot adjacent to an asphalt driveway and Facility 552. Facility 552 consisted of a fenced, bermed concrete pad constructed in 1964 that was used as a temporary hazardous waste collection point. Stored wastes include paint, chromic acid, and solvents generated during aircraft maintenance operations at Facility 550 (Weston, 1995a). Facility 550 contained a corrosion control facility that treated and painted aircraft parts and support equipment. A metals-processing shop in Facility 550 used plating solutions containing cadmium. Facility 1832 is a 15,000-gallon OWS that received liquids generated at a wash rack on the aircraft parking apron. In 1992, a new hazardous waste accumulation facility was constructed at the site.

In 2004, Facilities 550 and 552 were demolished to construct a POL MILCON project consisting of an office building, a fuel truck maintenance facility, and a large concrete parking area for trucks. This summary presents information on contaminants in the soil at SS015.

Selected Remedial Alternative(s)—Alternative 17 (Land Use Controls) is the selected remedial action for SS015 because cadmium concentrations in the soil exceed levels that allow for unlimited use and unrestricted exposure. Evaluations described in the Human Health Tech Memo determined that cadmium-contaminated soil is currently not a risk to human health, but as a conservative measure, land use controls will be implemented for cadmium to protect future potential residents and workers if the cadmium-contaminated soil at SS015 beneath the parking lot is exposed in the future.

The Eco Tech Memo determined that SS015 is not an ecological habitat. The Groundwater Protection Tech Memo determined that no soil action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for land use controls at SS015.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix H of the Human Health Tech Memo and the *Soil Removal Action Summary Report for North/East/ West Industrial Operable Unit Soil Removal Action at Site SS015, Travis Air Force Base, California* (SS015 Removal Action Summary Report) (Environmental, Inc., 2003).

During the RI, metals and PAH-contaminated soil were found that exceeded industrial PRGs. In 2003, a removal action was performed to remove the contaminated soils. Excavated soil was consolidated into the CAMU after testing confirmed that it met the CAMU acceptance levels.

Confirmation samples showed residual soil to be suitable for unlimited use and unrestricted exposure, and it was agreed that no further action was needed at the site.

However, during the 2004 demolition and excavation of Facility 550, cadmium was found in construction debris associated with the concrete flooring of the former plating shop. After disposal of the contaminated construction debris, sampling of the remaining soil/gravel indicated residual cadmium concentrations at non-detect levels at two of the four sample locations and at 39 mg/kg and 72 mg/kg at the other two locations, as shown on Figure H-1 of the Human Health Tech Memo. This soil originated from underneath the concrete flooring and had not been tested during previous investigations. The cadmium concentrations are less than the U.S. EPA industrial PRG (450 mg/kg) but exceed the U.S. EPA residential PRG (37 mg/kg). Given schedule and funding considerations, the construction project was completed, and the subject soil is now 2 feet below a concrete truck-parking area. Land use controls will be implemented for this site as long as cadmium concentrations in soil exceed levels that allow for unlimited use and unrestricted exposure.

Protection of Ecological Receptors—The Eco Tech Memo determined that SS015 is not an ecological habitat because it is an industrial area, and any grassy areas are mowed regularly and maintained to discourage wildlife from establishing a habitat (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 9.0 of the Groundwater Protection Tech Memo.

The RI concluded that PAHs at Facility 1832 are not a source of contamination to groundwater at SS015 because the detectable concentrations were primarily in surface soil samples. PAHs are not migrating into the subsurface, they were not detected in groundwater beneath Facility 1832, and they are unlikely to migrate to groundwater because of their affinity for soil particles. Therefore, no action is necessary for PAHs in soil to protect groundwater.

The RI concluded that the metals identified as COCs in soil were not sources of groundwater contamination because they were either not detected or only detected in surface soil at concentrations not exceeding background. Therefore, no action is necessary for metals in soil to protect groundwater.

Results of the Gore Sorber® study indicate that VOCs are present in soil gas, but the source could not be determined (groundwater or soil) (CH2M HILL, 1998b). A treatability study was conducted at SS015 to evaluate the effectiveness of using vegetable oil to enhance the biodegradation of VOCs in groundwater. The study was completed 14 March 2003 and showed localized degradation of VOCs. The extent of groundwater contamination has not been completely defined, and an evaluation of MNA is planned for groundwater cleanup at this site. If needed, more aggressive remediation methods, such as enhanced biodegradation or extraction and treatment of groundwater, may be implemented to remediate groundwater at SS015, but no soil action (such as excavation or SVE) is necessary for VOCs in soil gas to protect groundwater.

5.3.9 Oil Spill Area, Facilities 11, 13/14, 20, 42/1941, 139/144, and Selected Sections of Storm Sewer Right-of-Way (SS016)

Site Description—SS016 is in the center of the EIOU and includes the OSA, Facilities 11, 13/14, 20, 42/1941, 139/144, and the SSRW. The OSA covers approximately 7 acres north of Facility 16. The facilities within the site support flightline service equipment repair, aircraft engine repair, fuel storage, aircraft wash racks, and vehicle maintenance. A variety of solvents, hydraulic fluids, oils, fuels, and other materials are associated with these activities. Removal of USTs has occurred in various locations throughout SS016. The site is in an active area of Travis AFB (maintenance facilities and aircraft parking apron). The historic and current uses for each area within SS016 follow.

- **OSA:** Cleaning and degreasing operations occurred at Facility 18, which includes a wash rack, an OWS, and a subsurface open-top cement tank. The OSA originally encompassed an area where waste oil had reportedly been spilled or disposed of on a grassy area. The area is now entirely paved and covered with buildings.
- **Facilities 139/144:** The facilities were used for vehicle maintenance (Facility 139) and vehicle body shops (Facility 144). The facilities included former USTs, a wash rack area, a steam cleaner, and floor drains that directed runoff to two OWSs.
- **Facilities 13/14:** A wash rack, located between Facilities 13 and 14, was used from the mid-1950s to the mid-1960s. The facilities were used for paint stripping and cleaning parts using TCE and a dilute phosphoric acid solution. The facilities were demolished in 1988 and replaced by Building 31. The TPH contamination may be associated with the USTs located north and east of the site (now removed).
- **Facilities 42/1941 and 11:** The facilities included a hazardous waste storage area, a wash rack, an OWS, and four 250-gallon ASTs. A fuel pump area is on the western side. Facility 11 is a vehicle maintenance shop immediately south of Facilities 42/1941 that generated waste oil, hydraulic fluid, and waste fuel. An UST was formerly located east of the facility.
- **Facility 20:** This is an airfield control tower, where a possible fuel leak in a product line from a former UST occurred.

This summary presents information on contaminants in the soil at SS016.

Selected Remedial Alternative(s)—Alternative 17 (Land Use Controls) is the selected remedial action for the OSA because PAH levels in the soil exceed levels that allow for unlimited use and unrestricted exposure; Alternative 16 (No Action) is the selected remedial action for the remaining areas of SS016 (i.e., Facilities 11, 13/14, 20, 42/1941, 139/144, and the SSRW).

- **The OSA:** Evaluations performed in the Human Health Tech Memo determined that PAH contamination in soil at the site poses a potential human health risk and does not allow for unlimited use and unrestricted exposure.
- **Facilities 11, 13/14, 20, 42/1941, 139/144, and the SSRW:** Evaluations performed in the Human Health Tech Memo determined soil contamination in these areas of SS016 does not pose a potential human health risk.

The Eco Tech Memo determined that SS016 is not an ecological habitat. The Groundwater Protection Tech Memo determined that a groundwater extraction system is currently operating and capturing contaminated groundwater. No soil action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for land use controls at the OSA and no action at the remaining areas of SS016.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix I of the Human Health Tech Memo.

- OSA: As indicated above, Alternative 17 is the selected remedial action because PAH levels in the soil exceed levels that allow for unlimited use and unrestricted exposure. While PAH concentrations in these same samples exceed industrial PRGs, they do not pose an unacceptable potential risk to site workers because the site is fully paved, and the samples were collected from between 1 and 5 feet bgs. Thus, the exposure pathway for normal day-to-day operations is eliminated.
- TPH contamination in all areas of SS016: No action is necessary for TPH contamination in soil in all areas of SS016 because the locations are paved or covered with buildings; in most cases, less than one percent of the samples exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg); and the Air Force and regulatory agencies have agreed that TPH-contaminated soil at SS016 will naturally attenuate. The maximum reported TPH concentrations at each area of the site are presented hereafter:
 - OSA: 150 mg/kg (TPH-E);
 - Facilities 139/144: 2,000 mg/kg (TPH-E) and 430 mg/kg (total petroleum hydrocarbons, purgeable fraction [TPH-P]);
 - Facilities 13/14: 4,800 mg/kg (TPH-E) and 1,430 mg/kg (TPH-P);
 - Facilities 42/1941 and 11: 1,600 mg/kg (TPH-E); and
 - Facility 20: 1,200 mg/kg (TPH-E) and 3,000 mg/kg (TPH-P).

Protection of Ecological Receptors—The Eco Tech Memo determined that SS016 is not an ecological habitat because it is an industrial area, and any grassy areas are mowed regularly and maintained to discourage wildlife from establishing a habitat (Eco Tech Memo, Section 3.3.2 and Table 3-1). The grass-covered areas of the site are small in comparison to the paved areas (make up less than 10% of the site) and are located between buildings.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 10.0 of the Groundwater Protection Tech Memo.

PAHs and PCBs were reported in surface soil at the OSA, though PCBs were reported (below residential PRGs) in only one location; PCBs were not detected in the subsurface beneath most of the OSA. Samples were not collected for PAH or PCB analyses in the subsurface directly beneath the surface soil samples that contained these contaminants at the OSA; however, PAHs and PCBs were not detected in groundwater beneath the site, indicating that they have not migrated to groundwater. In addition, the PAH and PCB contamination has been covered with

asphalt, which will serve as a cap to further reduce the potential for migration of the contaminants to groundwater. If any contaminants were to leach from the vadose zone and migrate to groundwater, they would be captured by the existing extraction wells in place at the OSA and downgradient from the OSA. Therefore, no soil action for PAHs or PCBs is necessary to protect groundwater.

Soil at Facilities 13/14 and the wash rack at Facilities 42/1941 may have been a source of VOC contamination in the past, but it is no longer a source of VOC groundwater contamination. The VOC mass from soil has most likely migrated to groundwater and/or has volatilized into the air. The TCE contamination in groundwater is being addressed by interim groundwater remedial actions; therefore, no additional soil action for TCE in soil is necessary to protect groundwater at SS016.

TPH contamination in soil is expected to naturally attenuate. In addition, TPH that migrates to groundwater is being captured by the existing groundwater extraction systems in place at the OSA and downgradient from the OSA, the two horizontal extraction wells near the tower, and the groundwater extraction system at SS029. Therefore, no soil action for TPH in soil is necessary to protect groundwater at SS016.

5.3.10 Oxidation Pond Site (WP017)

Site Description—Site WP017 is in an inactive southeastern area of the Base. Sewage treatment plant oxidation ponds that were used between the 1950s and the late 1970s cover approximately 30% of the site. The treatment plant processed both domestic and industrial wastes until the late 1970s, when wastes were transferred to the Fairfield-Suisun Sewer District for treatment. Ponds along the southern Base boundary were used from the late 1970s to 1990 for the burial of construction materials, old tires, paint and oil containers, and landscape debris. Three north-eastern ponds are currently used as overflow for the sewage transfer station. This summary presents information on contaminants in the soil at WP017.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a significant human health risk to future residents, based on the residential PRGs, inorganic reference concentrations, and the San Francisco Bay RWQCB ESL for TPH. The findings of the ERA for WP017 detailed in the Eco Tech Memo demonstrate that potential exposure to COPECs does not pose an unacceptable level of risk to ecological receptors that may be present at the site. The Groundwater Protection Tech Memo determined that no soil remedial action is necessary at WP017 to protect groundwater.

The following paragraphs provide additional details supporting the decision for no action at WP017.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix J of the Human Health Tech Memo.

Aroclor-1260, arsenic, and TPH were the COCs identified at WP017. However, no action is selected for all COCs at WP017 because soil contamination at the site does not pose a significant risk to site workers or future residents. Aroclor-1260 concentrations in only one of 23 surface

samples (and 61 total samples) analyzed exceeded the residential PRG of 0.22 mg/kg. In addition, this result was estimated (J flagged) and is a field duplicate. The result from the normal sample was 0.596 mg/kg, which is less than the industrial PRG of 0.74 mg/kg. Arsenic concentrations in only 4 of 66 samples exceeded the inorganic reference concentration for surface soil of 14 mg/kg (from Table 7-1 in the WIOU RI), and the maximum detected concentration of arsenic (16.8 mg/kg) was estimated (J flagged) and could be a natural variation of background (14 mg/kg). The maximum reported concentration of TPH-E (6,810 mg/kg) exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg). However, only 1 sample out of 64 is above the screening level, the sample was estimated (J flagged), and the Air Force and regulatory agencies have agreed that the TPH-contaminated soil at WP017 will naturally attenuate.

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at WP017 was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include terrestrial plants, soil, and benthic invertebrates, birds, and mammals. The findings of the ERA, which are discussed in detail in Section 7.8 of the Eco Tech Memo, demonstrate that potential exposure to COPECs does not pose an unacceptable level of risk to ecological receptors that may be present.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 11.0 of the Groundwater Protection Tech Memo.

Metals, pesticides, and PCB contamination detected in surface soil were not detected in subsurface soil, indicating that the constituents had not migrated downward at the time of the RI in 1994. There were no detections of pesticides or PCBs in groundwater. Although chromium, mercury, nickel, and zinc were detected in soil at concentrations exceeding background during the RI, only nickel has been detected since in groundwater samples within the site boundaries of WP017 (in MW1005x05 and MW1006x05). The nickel was found to be the result of stainless steel well screens. Because the contaminants detected in soil had not migrated from the 1950s to the 1990s, they are not likely to migrate to groundwater. Therefore, no action is necessary for COCs in soil at WP017 to protect groundwater.

TPH that remains in soil is likely to naturally attenuate before reaching groundwater. In addition, if TPH were to migrate to groundwater, it would be captured by the existing extraction system at FT005. These factors indicate that the groundwater at WP017 is protected; thus, no soil remedial action is necessary to protect groundwater.

5.3.11 MW329x29 Area (SS029)

Site Description—SS029 consists of approximately 5.5 acres around monitoring well MW329x29 in the southern part of the EIOU, just south of the runway. The monitoring well was installed to evaluate the source of the TCE plume identified at MW269x30 at SS030. Analytical results from groundwater samples collected from MW329x29 suggest that there was a contaminant source in this area (Weston, 1995a). Historical aerial photographs of the area show aircraft parked in the area; however, activity appears limited, and no source of the plume has been identified. This summary presents information on contaminants in the soil at SS029.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil

contamination at the site does not pose a significant risk to future residents, based on the San Francisco Bay RWQCB ESL for TPH. The Eco Tech Memo determined that no COPECs at SS029 were found to pose an unacceptable risk to ecological receptors. The Groundwater Protection Tech Memo determined that no soil remedial action is necessary currently at SS029 to protect groundwater.

The following paragraphs provide additional details supporting the decision for no action at SS029.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix K of the Human Health Tech Memo.

No action is selected for all COCs identified at SS029. No action is selected for TPH in soils because the maximum reported concentration of TPH-E (180 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg). All other COCs identified in the RI were below residential PRGs except for manganese. One manganese result from a sample collected at 13 feet bgs was 2,400 mg/kg, which is below the industrial PRG but above the residential PRG of 1,800 mg/kg. The inorganic reference concentration (background) for manganese is 1,240 mg/kg in the subsurface. All other manganese results were below the residential PRG.

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at the site was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include birds and mammals. Terrestrial plants and soil invertebrates were not directly assessed because the source of contamination at SS029 is related to subsurface soil (greater than 4.5 feet bgs) and groundwater. The findings of the ERA demonstrate that potential exposure to COPECs in soil does not pose an unacceptable level of risk to ecological receptors that may be present. Although the inhalation pathway originating from groundwater vapors was not directly assessed in the Eco Tech Memo, this pathway will be addressed in the forthcoming Travis AFB Basewide Groundwater ROD. In the Basewide Groundwater ROD, cleanup levels for groundwater at the appropriate sites will be determined to address the vapor intrusion pathway for human receptors, and an investigation of the potential for ecological risk at SS029 will be included. Additional details regarding these findings are presented in Section 4.8 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 12.0 of the Groundwater Protection Tech Memo.

No source of VOCs in soil was identified; however, TCE was identified as a COC in both soil and groundwater. The maximum concentration of TCE in soil (0.123 mg/kg) is less than the soil leaching ESL of 0.40 mg/kg for drinking water. It is possible that VOCs present in the past have migrated to groundwater. An existing interim groundwater extraction system at SS029 will capture contaminants from SS029 that have migrated to groundwater; therefore, no action is necessary for VOCs in soil to protect groundwater.

No PAHs were reported in groundwater during the RI. The SVOC bis(2-ethylhexyl)phthalate was reported in a groundwater sample from MW329x29; however, bis(2-ethylhexyl)phthalate was not identified as a COC in soil. Because of the low concentrations of the SVOCs detected in soil and their tendency for strong sorption to soil grains, they are unlikely to migrate to and

contaminate groundwater. Groundwater is captured by the existing groundwater extraction system. Therefore, no action is necessary for SVOCs in soil to protect groundwater.

The RI concluded that metals detected in soil occur naturally and are included as COCs only because the cumulative risk of all detected metals concentrations exceeded the acceptable risk level. Naturally occurring metals concentrations in soil are not causing groundwater contamination. Therefore, no soil action is necessary for metals in soil to protect groundwater.

TPH in soil is not a source of groundwater contamination. It was detected in only one sample collected above the water table at a concentration that exceeded screening levels. In addition, TPH is expected to naturally attenuate. However, if any TPH were to migrate to groundwater, it would be captured by the existing groundwater extraction system at SS029. Therefore, no soil action is necessary for TPH in soil to protect groundwater.

5.3.12 MW269x30 Area (SS030)

Site Description—SS030 covers approximately 1.6 acres in the area around MW269x30 in the southern portion of the EIOU, near the southern Base boundary. The monitoring well was originally installed to evaluate water quality along the Base boundary (Weston, 1995a). The site is adjacent to a radar facility (Facility 1125); however, historical aerial photographs do not indicate any staining in the area or activities that may have been the source of contamination identified during the RI. This summary presents information on contaminants in the soil at SS030.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a potential risk to current industrial workers or future residents, based on residential PRGs. The Eco Tech Memo determined that SS030 is not an ecological habitat. The Groundwater Protection Tech Memo determined that a groundwater extraction system is currently operating and capturing contaminated groundwater. No additional soil remedial action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for no action at SS030.

Protection of Human Health— The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix L of the Human Health Tech Memo.

All COCs identified in the RI were below residential PRGs except for antimony. One antimony result from a sample collected at 13 feet bgs was 37.6 mg/kg (J- flagged), which is below the industrial PRG (the cleanup level) but above the residential PRG of 31 mg/kg. All other results were below the residential PRG.

Protection of Ecological Receptors—The Eco Tech Memo determined that SS030 is not an ecological habitat. Approximately 25% of the site is covered by pavement or buildings, and the area is adjacent to the Base perimeter road and maintained to discourage habitat formation (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 13.0 of the Groundwater Protection Tech Memo.

Soil contaminated with VOCs may be a minor source of groundwater contamination; however, most of the mass of VOCs has entered the groundwater and/or volatilized to the air and does not represent a future source in soil (Weston, 1995a). TCE was identified as a COC both in soil and in groundwater. However, the maximum concentration of TCE in soil (0.197 mg/kg) is less than the soil leaching ESL of 0.40 mg/kg for drinking water. In addition, an interim groundwater extraction system at SS030 will capture contaminants that have migrated to groundwater; therefore, no action is necessary for VOCs in soil to protect groundwater.

SVOCs were detected in soil; however, concentrations are very low, and they were not detected in groundwater at the time of the RI in 1995, most likely because of their low solubilities. Therefore, no action is necessary for SVOCs in soil to protect groundwater.

The RI concluded that metals in soil might be a source of metals contamination in groundwater. However, nickel concentrations in groundwater, investigated in 1998, were determined to be the result of the corrosion of stainless steel well screens. Because other metals were not identified as COCs in groundwater during the RI or during subsequent investigations, the metals in soil have not migrated to groundwater in concentrations that threaten groundwater. Therefore, no soil action is needed to protect groundwater from metals.

5.3.13 MW107x32 and MW246x32 Areas (ST032)

Site Description—The MW107x32 and MW246x32 areas are in the southern portion of ST032, also known as the Plume B area, in the central part of the EIOU. The area consists of grassy, open areas between a runway and an abandoned taxiway. Land use and personnel access is severely restricted because of the proximity of the runway. This site is in a restricted area and a designated clear zone (an area in which there shall be no vertical obstructions to aircraft). MW107x32 and MW246x32 are in the area of the SSRW. Underground fuel line leaks may have contributed to soil and groundwater contamination in the area. This summary presents information on contaminants in the soil at ST032.

Selected Remedial Alternative(s)—Alternative 17 (Land Use Controls) is the selected remedial action for ST032 because, as discussed below, benzene levels in the soil exceed levels that allow for unlimited use and unrestricted exposure.

The Eco Tech Memo determined that ST032 is not an ecological habitat, and the Groundwater Protection Tech Memo determined that no soil action is necessary to protect groundwater at ST032.

The following paragraphs provide additional details supporting the decision for land use controls at ST032.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix M of the Human Health Tech Memo.

Benzene, arsenic, and TPH were identified as COCs at this site. However, only benzene contamination poses a potential risk to future residents. Eight of the 40 RI soil VOC samples exceed residential PRGs and require land use controls. Five of the 40 RI soil VOC samples exceed industrial PRGs. However, the VOCs do not pose an unacceptable potential risk to site workers because the five samples where benzene exceeded the industrial PRG were in the subsurface, at depths of 5 to 15 feet, which is the saturated zone associated with the TPH-contaminated plume at ST032 (see Protection of Groundwater, hereafter). Thus, the exposure pathway for normal day-to-day operations is eliminated. In addition, this site is adjacent to the Base runway and is already in a restricted area and a designated clear zone (the area in which there shall be no vertical obstructions to aircraft, which is required for the mission of Travis AFB).

No action is necessary for arsenic and TPH contamination. The maximum concentration of arsenic (17.2 mg/kg at 12 to 13.5 feet bgs) only slightly exceeds the background reference concentration (14 mg/kg). The maximum reported concentration of TPH-E is 1,700 mg/kg, and the maximum reported concentration of TPH-P is 3,900 mg/kg. Only two samples out of 40 (5%) exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg). One of the samples is at a depth of 12 to 13.5 feet, which is the saturated zone associated with the TPH-contaminated plume at ST032 (see Protection of Groundwater, hereafter). In addition, the Air Force and regulatory agencies have agreed that the TPH-contaminated soil at ST032 will naturally attenuate.

Protection of Ecological Receptors—The Eco Tech Memo determined that ST032 is not an ecological habitat because it is surrounded by taxiway and runway. Also any grassy areas are regularly mowed and maintained to discourage wildlife from establishing a habitat (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 14.0 of the Groundwater Protection Tech Memo.

PAHs were detected in surface and subsurface soil (at concentrations below residential PRGs); however, though SVOCs were detected in groundwater, the PAHs identified in soil were not detected in groundwater. Also, because of their chemical structure, the PAHs are unlikely to break down into the SVOCs detected in groundwater. Because PAHs have low mobility, adsorb to soils, and have not migrated to groundwater since they were released, they are unlikely to do so and do not pose a risk to groundwater. Therefore, no soil action is necessary for PAHs to protect groundwater.

Aroclor-1260 and alpha-chlordane also were reported in surface soil only (at concentrations below residential PRGs). Because they have not leached into the subsurface, they are unlikely to do so. Therefore, no action is necessary for PCBs or alpha-chlordane in soil to protect groundwater.

TPH and benzene contamination in soil at ST032 has impacted groundwater. However, floating product was removed from groundwater using a passive skimmer from 1998 to 2004; product was so minimal, it has not been measurable since 2001 (URS, 2004c). Excavation of contaminated soil at ST032 would interfere with the mission of Travis AFB because of the presence of the clear zone. Therefore, the Air Force and regulatory agencies have agreed that no soil action is necessary to protect groundwater at ST032. The TPH-contaminated soil at ST032 will naturally attenuate. Remediation of groundwater contamination was re-evaluated in the

Consolidation of the ST032 into the South Interim Remedial Action (CH2M HILL, 2001). Natural attenuation will most likely occur, and monitoring was deemed unnecessary because the plume is fully captured by the SS029 extraction well system. No soil action is necessary to protect groundwater at ST032.

5.3.14 Storm Sewer System B (West Branch of Union Creek), Facilities 810 and 1917, and South Gate Area (SD033)

Site Description—SD033 includes the West Branch of Union Creek, parts of SS II (previously called Storm Sewer System B), Facilities 810 (with an abandoned OWS, sump, and wash rack) and 1917 (with an OWS and sumps that are no longer in use), the area around the South Gate (where a fuel distribution line is located), and Outfall II. The SSS and Facility 810 are still in use.

SS II, comprising underground piping and the West Branch of Union Creek, collects runoff from within the WIOU and small portions of the EIOU and WABOU. Runoff from SS II enters Union Creek south of the WIOU at Outfall II.

Facility 810 is used for aircraft-refurbishing activities. An OWS, sump, and wash rack that were at the facility discharged to SS II, but they have been abandoned. The facility no longer discharges to the storm sewer.

This summary presents information on contaminants in soil, sediment, and surface water at SD033.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for sediment in the West Branch of Union Creek in the area of sample location U17 (shown on Figures II-5-2 and II-5-8) with concentrations of PAHs that pose a potential ecological risk. Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of PAHs remaining in sediment after excavation exceed levels that allow for unlimited use and unrestricted exposure. Based on RI data, all excavated sediment should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated sediment that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

Alternative 17 (Land Use Controls) is the selected remedial action for cadmium- and benzo(a)pyrene-contaminated soil at Facility 810 because the levels of cadmium and benzo(a)pyrene in the soil exceed levels that allow for unlimited use and unrestricted exposure.

Alternative 16 (No Action) is the selected remedial action for the soil at this site, and Alternative 10 (No Action) is the selected remedial action for surface water. Evaluations performed in the WIOU RI and described in the Human Health Tech Memo determined that soil, sediment, and surface water at the remaining areas of SD033 do not pose a potential risk to current industrial workers or future residents. Groundwater extraction and treatment has been implemented as part of the WABOU and NEWIOU Groundwater IRODs to control possible migration of TCE-contaminated groundwater to Union Creek. No action is necessary, nor will any be implemented, under this ROD for surface water. The WIOU RI and Groundwater Protection Tech Memo determined no soil, sediment, or surface water remedial action is necessary to protect groundwater.

Table II-5-13 presents the sediment cleanup levels for the COCs and COECs at the site.

Table II-5-13

Cleanup Levels for Sediment COCs and COECs at SD033 (West Branch of Union Creek)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern/ Contaminant of Ecological Concern	Sediment Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10 ⁻⁶ Cancer Risk	Chronic HI=1	10 ⁻⁶ Cancer Risk	Chronic HI=1		
Benzo(a)anthracene	Total	0.62	NE	2.1	NE	Total PAHs=1 ^a	No
Benzo(a)pyrene	PAHs=1	0.062	NE	0.21	NE		No
Benzo(b)fluoranthene		0.62	NE	2.1	NE		No
Benzo(g,h,i)perylene		NE	NE	NE	NE		No
Chrysene		62	NE	210	NE		No
Fluoranthene		NE	2,300	NE	22,000		No
Indeno(1,2,3-cd)pyrene		0.62	NE	2.1	NE		No
Phenanthrene		NE	NE	NE	NE		No
Pyrene		NE	2,300	NE	29,000		No

^a A level of 1 mg/kg was agreed to be proactive of demersal fish based on the NOAA Screening Quick Reference Tables (NOAA SQT) (Buchman, 1999).

COC = contaminant of concern
COEC = contaminant of ecological concern
HI = hazard index
mg/kg = milligrams per kilogram
NE = a value has not been established

NEWIOU = North/East/West Industrial Operable Unit
PAH = polycyclic aromatic hydrocarbons
ROD = record of decision
TQ = toxicity quotient

The Air Force will excavate the PAH-contaminated sediment in the West Branch of Union Creek in the area of sample location U17 based on sediment cleanup levels in Table II-5-13. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete for ecological receptors or if land use controls will be implemented to address human health issues. The estimated excavation area for SD033 is shown on Figure II-5-8. The excavation will be in the area of sample location U17 (from Outfall II to the confluence of the West and Main Branches of Union Creek). The estimated volume of soil to be excavated is approximately 200 cubic yards. As agreed with the regulatory agencies, the excavation will not be backfilled (with gravel or soil). Habitat will be allowed to restore naturally, to provide suitable conditions for a variety of benthic and aquatic species. The estimated costs for the alternatives evaluated for SD033 are summarized in Table II-5-14. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting ecological receptors.

The following paragraphs provide additional details supporting the decision for excavation of sediment in the West Branch of Union Creek at sample location U17, land use controls at Facility 810, no action for soil, no action for sediment in other areas of SD033, and no action for surface water at SD033.

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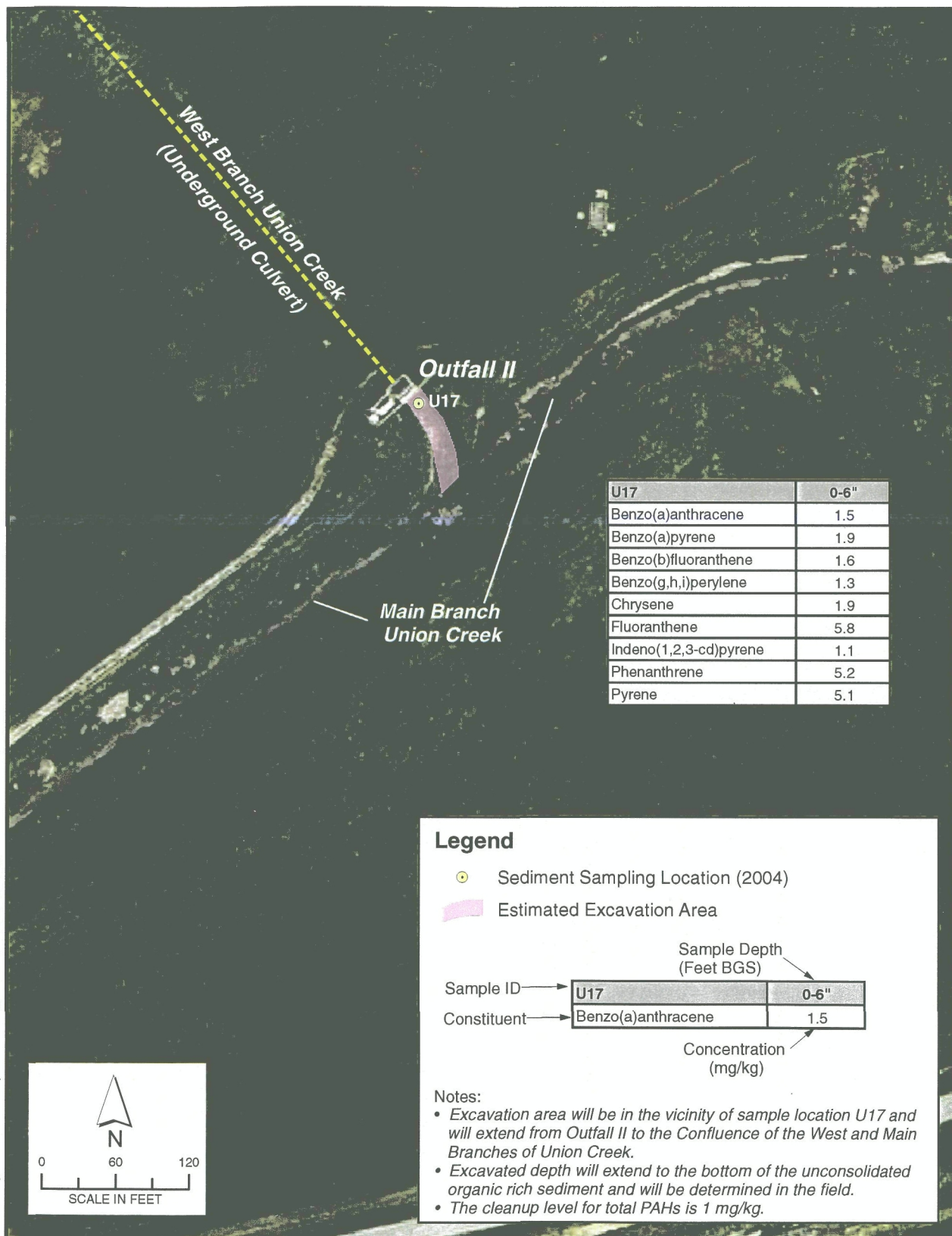


Figure II-5-8.
SD033 (West Branch of Union Creek)
Estimated Excavation Area

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Table II-5-14

Estimated Cost of Remedial Alternatives Evaluated for SD033 (West Branch of Union Creek)

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost (\$)
17 (Land Use Controls)	100,183 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	30,000 ^a
19 (Capping)	Not Evaluated ^b
20 (Excavation /Thermal Treatment)	120,000 ^c

^a Cost estimated based on the excavation of 200 cubic yards of soil at \$150/cubic yard, with all soils meeting CAMU acceptance criteria. The volume of soil to be excavated is estimated based on the following excavation dimension assumptions: 100-linear-foot length, 30-foot width, and 1.5-foot depth.

^b Capping or paving the creek bed was not considered appropriate, and therefore was not evaluated.

^c Thermal treatment cost estimated based on treating 200 cubic yards of soil at \$600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Protection of Human Health—The following findings and conclusions with respect to soil, sediment, and surface water contamination and the potential risks to human health were reached in the WIOU RI (Radian, 1996b) and in Appendix N of the Human Health Tech Memo.

PAHs, cadmium, pesticides, and TPH were identified as COCs at this site. However, only PAHs and cadmium concentrations in soil at Facility 810 pose a potential risk to future residents. Concentrations in two of four cadmium samples and one PAH sample collected at Building 810 exceed residential PRGs and require LUCs for future residents. Benzo(a)pyrene concentrations in 3 of 14 samples exceed industrial PRGs but do not pose an unacceptable potential risk to current workers because contaminants were in the subsurface from 0.25 to 9 feet bgs. Thus, the exposure pathway for normal day-to-day operations is eliminated.

No action is necessary for dieldrin (a pesticide) and TPH contamination. Only one in 27 samples analyzed for dieldrin was above the industrial PRG. Only one in 61 samples of TPH-E (2,466 mg/kg) exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg). The area of contamination is considered small, and the Air Force and regulatory agencies have agreed that the TPH-contaminated soil at SD033 will naturally attenuate.

Union Creek sediment and surface water was sampled in 2004 to provide current data for an ERA. The results are included in the Eco Tech Memo and show that concentrations have reduced substantially since the RI. This change in concentrations probably is the result of a combination of improved pollution prevention practices at the Base, periodic dredging of the creek, groundwater source control (discussed hereafter), and natural forces that affect sediment contamination and location. Based on this information, no action is selected for Union Creek surface water for human health risk. Although the sediment is not a risk to recreational users, the contamination remaining after excavation may present a potential risk in a residential scenario. Thus, land use controls will be implemented to address human health issues if concentrations of PAHs remaining in sediment after excavation exceed levels that allow for unlimited use and unrestricted exposure.

Source control (groundwater pump and treat) has been implemented under the WABOU and NEWIOU Groundwater IRODs to address the migration of groundwater contaminated with VOCs (primarily TCE) to Union Creek. The groundwater extraction systems reduce the levels of contamination in the groundwater and, by lowering the water table, control the flow of groundwater into Union Creek and associated storm sewer systems. The levels of contamination in groundwater and surface water are monitored by the Base GSAP.

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at SD033 was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include aquatic plants, fish, benthic and aquatic invertebrates, birds, and mammals. The findings of the ERA, which are discussed in detail in Section 7.10 of the Eco Tech Memo, demonstrate that potential exposure to PAHs that may be present in sediment at sample location U17 (shown on Figure II-5-2) poses an unacceptable level of risk to juvenile fish. Excavation of sediment in this area of the creek is selected to address potential ecological issues at the site.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 15.0 of the Groundwater Protection Tech Memo.

The WIOU RI concluded that PAHs and metals contamination identified in soil, sediment, or surface water does not contaminate groundwater at SD033. In addition, Union Creek is generally a gaining stream, and surface water VOC concentrations are below those in any adjacent groundwater plumes. Therefore, no soil, sediment, or surface water action is necessary for the protection of groundwater.

5.3.15 Facility 811 (SD034)

Site Description—SD034 encompasses Facility 811 in the northern portion of the WIOU on Ragsdale Street, south of Hangar Avenue. Approximately 75% of the area is covered with crushed aggregate and asphalt. Facility 811 was constructed in 1979 as a large aircraft maintenance hangar and includes an indoor wash rack, an OWS, and a concrete-lined overflow pond. Aircraft surfaces are washed at the wash rack. Wastewater from the wash rack flows into an OWS. Flow from the OWS can be directed into either the sanitary sewer or a concrete-lined overflow pond just west of the facility. A hole was discovered in the OWS during 1994; the OWS has since been removed and replaced. No over-excavation was performed around the OWS during the removal. This summary presents information on contaminants in the soil at SD034.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a potential risk to current industrial workers or future residents based on residential PRGs and the San Francisco Bay RWQCB ESL for TPH (2,300 mg/kg). The Eco Tech Memo determined that SD034 is not an ecological habitat. The Groundwater Protection Tech Memo determined that a groundwater extraction system is currently operating and capturing contaminated groundwater. No additional soil remedial action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for no soil action at SD034.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix O of the Human Health Tech Memo.

The maximum reported concentrations of TPH-E (11,600 mg/kg) and TPH-P (15,900 mg/kg) exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg). However, the area of contamination is considered to be small; only 2 samples out of 16 exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg). Both of the samples are at a depth of 14 feet bgs, which is the saturated zone associated with the TPH-contaminated plume at SD034, and the Air Force and regulatory agencies have agreed that the TPH-contaminated soil at SD034 will naturally attenuate.

Protection of Ecological Receptors—The Eco Tech Memo determined that SD034 is not an ecological habitat. Approximately 75% of the site is covered with crushed aggregate, asphalt, and the building. Some grassy area is kept mowed and maintained, which discourages habitat formation (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 16.0 of the Groundwater Protection Tech Memo.

The groundwater is being cleaned up in accordance with the NEWIOU Groundwater IROD, which included floating product removal from 1998 to 2004 (URS, 2004c) and groundwater extraction and treatment (Travis AFB, 1997). A groundwater extraction system is currently operating and capturing contaminated groundwater. No additional soil remedial action is necessary to protect groundwater.

5.3.16 Facility 818/819 (SS035)

Site Description—SS035, in the north central portion of the WIOU, contains Facility 818/819. Facility 818/819 was constructed in 1970/1974 as a large aircraft maintenance hangar, and it includes a wash area, OWS and sump, hydraulic lift storage area, and hazardous material accumulation area. Asphalt and crushed aggregate cover most of this site, though there is some exposed soil and grass along the eastern end of Facility 818. The site has been used historically and currently (since construction in 1970/1974) to repair, wash, and paint aircraft. This summary presents information on contaminants in the soil at SS035.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a potential risk to current industrial workers or future residents based on residential PRGs. The Eco Tech Memo determined that SS035 is not an ecological habitat. The Groundwater Protection Tech Memo determined that contamination that may have migrated from SS035 will be captured by the WIOU groundwater extraction system, downgradient. No additional soil remedial action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for no soil action at SS035.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix P of the Human Health Tech Memo.

PCBs were identified as COCs at this site; however, no action is selected for potential human risk from PCBs because all samples were below industrial PRGs, and the concentration in only 1 sample of 17 samples analyzed slightly exceeded the residential PRG of 0.22 mg/kg. Six samples were collected and analyzed using U.S. EPA method SW8080, with maximum reported concentrations of 0.319 mg/kg Aroclor-1254 and 0.204 mg/kg Aroclor-1260. Twenty-six additional surface samples were collected, and 11 of those closest to the soil borings where PCBs were detected were analyzed using Ensysis PCB field screening kits. Aroclor-1260 was detected in only 1 sample at a concentration of 0.0516 mg/kg. In addition, the surface area of contamination is less than 0.04 acre, which, relative to the total area of the grassy eastern side of Facility 818 (1.1 acre), indicates a low area use.

Protection of Ecological Receptors—The Eco Tech Memo determined that SS035 is not an ecological habitat because of the proximity of the site to Facility 818 and the parking ramp (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 17.0 of the Groundwater Protection Tech Memo.

VOCs previously released to the soil have entered the groundwater and do not represent a future source in soil. VOCs and TPH were identified as COCs in groundwater. However, VOC contamination that may have migrated from SS035 will be captured by the WIOU groundwater extraction system downgradient. Therefore, no action for soil is necessary to protect groundwater.

PCBs and metals identified as COCs and COPECs in soil at SS035 were detected in surface soil but not in subsurface soil, indicating that they are not leaching to the vadose zone and will not migrate to groundwater. PCBs were not detected in groundwater and, though the metals molybdenum, silver, and vanadium were detected in groundwater, they did not exceed PRGs and were not identified as COCs in groundwater. Therefore, no action for PCBs and metals in soil is necessary to protect groundwater.

5.3.17 Facility 872/873/876 (SD036)

Site Description—SD036 in the southeastern end of the WIOU, includes Facilities 872, 873, and 876. The site, while mostly paved, is surrounded by buildings and is situated in an active area of the Base. The West Branch of Union Creek borders the eastern side of the site. Constructed in 1953, the facilities included a wash rack south of Facility 872, a locksmith shop, and a paint shop that were historically used for vehicle and electric motor maintenance, paint mixing, and storage. The buildings are now used for civil engineering mobile equipment storage and maintenance. This summary presents information on contaminants in the soil at SD036.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a potential risk to current industrial workers or future residents based on residential PRGs and the San Francisco Bay RWQCB ESLs for TPH. The Eco Tech Memo determined that SD036 is not an ecological habitat. The Groundwater Protection Tech Memo determined that a groundwater extraction system is currently operating and capturing contaminated groundwater. No additional soil remedial action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for no soil action at SD036.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix Q of the Human Health Tech Memo.

The maximum reported concentrations of TPH-E (621 mg/kg) and TPH-P (292 mg/kg) do not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—The Eco Tech Memo determined that SD036 is not an ecological habitat because the site is paved with 2 to 4 feet of asphalt and roadbase material and is surrounded by buildings (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 18.0 of the Groundwater Protection Tech Memo.

COCs identified in the soil during the RI include TPH-P and TPH-E, and groundwater COCs include VOCs (such as TCE, vinyl chloride, and TPH). TPH in soil at SD036 has been, and still may be, contaminating groundwater. However, the contaminated soil at SD036 will naturally attenuate, based on the *Remediation Guidance for Petroleum and VOC Impacted Sites* (RWQCB, Los Angeles Region, 1996), which presents guidelines governing cleanup at sites with petroleum hydrocarbon contamination. The groundwater is being cleaned up in accordance with the NEWIOU Groundwater IROD (Travis AFB, 1997), including an interim remedial groundwater extraction system that has been in operation since April 2000 and fully captures the SD036 TPH plume. No additional soil action is necessary to protect groundwater.

5.3.18 Sanitary Sewer System, Facilities 837/838, 919, 977, and 981, Area G Ramp, and Ragsdale/V Area (SD037)

Site Description—SD037 encompasses a large portion of the WIOU, including Facilities 837, 838, 919, 977, and 981, the Area G Ramp, and the Ragsdale/V area. Operations at the facilities have included approximately 22,000 feet of sanitary sewer piping, an OWS, sumps, wash racks, and a fuel-hydrant system. Historically and currently, the sanitary sewer system is used to convey domestic and industrial wastewater from facilities within the WIOU to the Fairfield-Suisun publicly owned treatment works. USTs have been removed from various locations within SD037. The current and historic uses for each area within SD037 follow.

- Area 1 is where a surface sample was collected for sanitary sewer system investigation.
- Areas 2 and 3 are between the sanitary sewer system and the jet fuel distribution pipeline.
- Area 4 is at Facility 919, constructed in 1984 and currently used to maintain heavy equipment. An OWS and a hazardous waste satellite accumulation point are east of the facility. The OWS at the facility is connected to the sanitary sewer system.
- Area 5, which includes Facility 981, is next to a wash rack with an OWS connected to the sanitary sewer; it has a hazardous waste satellite accumulation point.

- Area 6 is at Facility 977, which was constructed in 1972 as an air freight terminal at which hydraulic equipment was used to load and unload cargo. Leaking hydraulic rams were replaced and are periodically checked for leaks.

This summary presents information on contaminants in the soil at SD037.

Selected Remedial Alternative(s)—Alternative 17 (Land Use Controls) is the selected remedial action at Area 6 for soil with PAH, lead, and TPH concentrations that exceed levels allowing unlimited use and unrestricted exposure. Alternative 16 (No Action) is the selected remedial action for Areas 1 through 5.

- Area 6: Evaluations described in the Human Health Tech Memo determined that PAH, TPH, and metals contamination in soil at the site pose a potential risk to future residents based on residential PRGs.
- Areas 1 through 5: Evaluations described in the Human Health Tech Memo determined that soil contamination in these five areas of the site does not pose a potential risk to current industrial workers or future residents based on industrial and residential PRGs.

The Eco Tech Memo determined that SD037 is not an ecological habitat, and the Groundwater Protection Tech Memo determined that a groundwater extraction system is currently operating and capturing contaminated groundwater. No additional soil action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for land use controls at Area 6 and no action at Areas 1 through 5.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in the Human Health Tech Memo, Appendix R.

- Area 6, Facility 977: Land use controls will be implemented for the soil contaminated with PAHs, lead, and TPH because concentrations in soil exceed the residential PRGs and San Francisco Bay RWQCB ESL for TPH and pose a potential risk to future residents. Benzo(a)pyrene and benzo(b)fluoranthene concentrations in two of four samples collected and lead concentrations in one of five samples exceed residential PRGs and require land use controls for future residents. PAH and lead concentrations in these same samples also exceed industrial PRGs but do not pose an unacceptable potential risk to site workers because the samples were collected between 1 and 5 feet bgs and because the site is fully paved with asphalt and includes a building. Thus, the exposure pathway for normal day-to-day operations is eliminated. The maximum reported concentration of TPH-E (3,580 mg/kg) exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg).
- Area 1: No action is necessary for soil with SVOC concentrations that exceed industrial PRGs (human health risk) because only one isolated detected concentration exceeds the industrial PRG for benzo(a)pyrene, and the risk is less than 10^{-5} . In addition to benzo(a)pyrene, two other PAHs were identified as COCs for the sanitary sewer system at SD037. Maximum concentrations of both benzo(a)anthracene and benzo(b)fluoranthene are less than industrial PRGs but exceed residential PRGs at the same location where

benzo(a)pyrene exceeds the industrial PRG. However, out of eight locations analyzed for PAHs, only this one had concentrations of PAHs that exceed residential PRGs. Because of the low overall percentage of exposure to concentrations of PAHs that pose a risk to human receptors at the sanitary sewer system, no action is necessary for the area at sampling location WSNS0B01.

- **Area of Surface Flux Samples:** No action is necessary for the area where surface flux samples were collected because only one isolated detected concentration from 26 samples poses potential risk, and it is located in an area with dual-phase wells that extract soil vapor.
- **TPH-contamination in Areas 1 through 5:** No action is necessary for TPH-contamination in soil in Areas 1 through 5 of SD037 because the samples do not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg). The maximum reported TPH concentrations at these areas of the site are presented hereafter.
 - Area 1: 105 mg/kg (TPH-E);
 - Area 2: 103 mg/kg (TPH-E);
 - Area 3: 256 mg/kg (TPH-E);
 - Area 4: 271 mg/kg (TPH-E) and 909 mg/kg (TPH-P); and
 - Area 5: 1,477 mg/kg (TPH-E).

Protection of Ecological Receptors—The Eco Tech Memo determined that SD037 is not an ecological habitat because it is an industrial area, and any grassy areas are regularly mowed and maintained to discourage wildlife from establishing a habitat (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 19.0 of the Groundwater Protection Tech Memo.

No soil action is necessary to protect groundwater. PAHs, bis(2-ethylhexyl)phthalate, and metals contaminants were reported primarily in surface soil. Metals reported in the subsurface reflect natural variations of background, indicating that the surface metals contamination has not leached into the subsurface and migrated to groundwater. PAHs were not detected in groundwater, and neither PAHs nor metals were identified as a COC in groundwater. Bis(2-ethylhexyl)phthalate is identified as a COC in soil and groundwater; however, detections in soil are sporadic, and the maximum reported concentration of 0.309 mg/kg is significantly less than the residential PRG of 35 mg/kg. Generally, locations where bis(2-ethylhexyl)phthalate was detected in soil do not correspond with locations where it was detected in groundwater. Although bis(2-ethylhexyl)phthalate was detected in groundwater at the location of the maximum detected concentration of bis(2-ethylhexyl)phthalate in soil, bis(2-ethylhexyl)phthalate was not detected in the subsurface between the surface soil detection and groundwater. Therefore, PAHs, bis(2-ethylhexyl)phthalate, and metals do not pose a threat to groundwater.

The groundwater is being cleaned up in accordance with the NEWIOU Groundwater IROD, which includes groundwater extraction and treatment. A groundwater extraction system is

currently operating and capturing contaminated groundwater. No soil action is necessary to protect groundwater.

5.3.19 Summary of Selected Remedial Alternatives

Table II-5-15 summarizes the selected remedial alternatives for each NEWIOU (soil, sediment, and surface water site).

Table II-5-15

Selected Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Site Description	Site Designation	Medium	Selected Alternative
Storm Sewer Right-of-Way (includes Main Branch of Union Creek)	SD001	Soil	16 – No Action
		Sediment	18 – Excavation ^a
			17 – Land Use Controls ^b
		Surface Water	10 – No Action ^c
Fire Training Area 1	FT002	Soil	16 – No Action
Fire Training Area 2	FT003	Soil	18 – Excavation
			17 – Land Use Controls ^b
Fire Training Area 3	FT004	Soil	18 – Excavation
			17 – Land Use Controls ^b
Fire Training Area 4	FT005	Soil	18 – Excavation
			17 – Land Use Controls ^b
Base Landfill No. 2	LF007	Soil	18 – Excavation
			17 – Land Use Controls ^b
Sludge Disposal Site	OT010	Soil	16 – No Action
Solvent Spill Area, Facilities 550/552, and 1832	SS015	Soil	17 – Land Use Controls. Cleanup has been completed as a removal action.
Oil Spill Area, Facilities 11, 13/14,20, 42/1941, 139/144, and sections of Storm Sewer Right-of-Way	SS016	Soil	17 – Land Use Controls
Oxidation Pond Site	WP017	Soil	16 – No Action
MW-329 Area	SS029	Soil	16 – No Action
MW-269 Area	SS030	Soil	16 – No Action
MW-107, MW-246	ST032	Soil	17 – Land Use Controls
Storm Sewer System B (includes West Branch of Union Creek), Facility 810, Facility 1917, and South Gate Area	SD033	Soil	17 – Land Use Controls
		Sediment	18 – Excavation ^a
			17 – Land Use Controls ^b
		Surface Water	10 – No Action ^c
Facility 811	SD034	Soil	16 – No Action
Facilities 818 and 819	SS035	Soil	16 – No Action
Facilities 872, 873, and 876	SD036	Soil	16 – No Action
Sanitary Sewer System, Facilities 837, 838, 919, 977, and 981, Area G Ramp, and Ragsdale/V Area	SD037	Soil	17 – Land Use Controls

Table II-5-15 (Cont'd)

Selected Remedial Alternatives

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

- ^a Excavation for sediment at SD001 will be a total of 500 linear feet at sample point 0014 (250 upstream, 250 downstream). Excavation for sediment at SD033 will be in the area of sample point U17 (from Outfall II to the confluence of the West and Main Branches of Union Creek).
- ^b Land Use Controls will be required if the levels of hazardous substances remaining in the soil or sediment after excavation do not allow for unlimited use and unrestricted exposure. For protection of the integrity of the CAMU cover at LF007, land use controls will be required to restrict any activities on the cover other than operations and maintenance activities.
- ^c The 1998 NEWIOU SSSW Proposed Plan proposed "Source Control" (extraction and treatment of groundwater) as the cleanup alternative for surface water at these sites, indicating Union Creek is not a source of contamination, but that the creek may be receiving TCE-contaminated water from groundwater through storm sewer infiltration. Subsequent to the 1998 NEWIOU SSSW Proposed Plan, extraction and treatment (pump and treat) of contaminated groundwater was implemented as part of the WABOU and NEWIOU Groundwater IRODs. GSAP sampling has shown that extraction of groundwater has reduced the levels of TCE in the creek to levels that do not pose a risk to human health or the environment. As "Source Control" or extraction and treatment of groundwater has already been implemented under the groundwater IRODs, no action will be implemented under this ROD for surface water.

CAMU	=	Corrective Action Management Unit	ROD	=	record of decision
GSAP	=	groundwater sampling and analysis program	SSSW	=	soil, sediment, and surface water
IROD	=	interim record of decision	TCE	=	trichloroethene
NEWIOU	=	North/East/West Industrial Operable Unit	WABOU	=	West/Annexes/Basewide Operable Unit
PRG	=	preliminary remediation goal			

5.4 Land Use Controls (LUCs)

Alternative 17 (Land Use Controls) is included as all or part of the selected remedy at 10 NEWIOU soil and/or sediment sites, as described in Table II-5-15 and Section 5.1.3 (Alternative 17—Land Use Controls). Alternative 17 is or may be required at SD001, FT003, FT004, FT005, LF007 and SD033 because the selected remedial actions will clean up soil contamination to industrial cleanup levels but may allow for residual contamination to be left in place. If residual contamination is at levels that do not allow for unlimited use and unrestricted exposure, land use controls would be required. If it is economically feasible, the Air Force may decide to clean up soil to levels that allow for unlimited use and unrestricted exposure (residential cleanup levels). If the Air Force does achieve residential cleanup levels at a site, then land use and access restrictions would not be necessary, as discussed in Section 5.4.2 (Residential Cleanup Levels).

At sites SS015, SS016, ST032, and SD037, no active remedial action is needed because the contamination levels either do not exceed industrial cleanup levels or there is limited exposure, if any, under an industrial scenario, given the small areas of contamination (located under parking lots, in restricted access areas, etc.). Alternative 17 is required because residual contamination levels do not allow for unlimited use and unrestricted exposure.

The map on Figure II-5-9 depicts the boundaries of NEWIOU sites with soil and sediment contamination (including courses of Union Creek) with LUCs or LUC potential. As the footnote on the map indicates, the Air Force's commitment to include more specific LUC maps in the Base General Plan is discussed in Section 5.4.1.

The RAO of Alternative 17 is to restrict residential development (including day care centers, K-12 schools, play areas, and hospitals) and to prevent unauthorized disturbance and relocation

of the contaminated soil (such as use of excavated contaminated soil as fill) at areas where soil contamination is at levels that do not allow for unlimited use and unrestricted exposure. Alternative 17 also prevents unauthorized disturbance and relocation of contaminated sediment. Alternative 17 is accomplished by a prohibition on residential development and restrictions on soil and sediment disturbance in designated areas set forth in the Base General Plan, administrative measures, and signage. For the CAMU cover at LF007, Alternative 17 prohibits all activities on the cover other than CAMU operations and maintenance activities, as described in the *LF007 Soil Remedial Action Design Report and Post-Closure Maintenance Plan* (CH2M HILL, 2002). The administrative measures are the base Civil Engineer work request procedures, the Base dig permit procedures, and the EIAP, as described in Section 5.4.1. Signs warn site visitors that soil excavation and removal is controlled. The EIAP, work request, and Base dig permit procedures restrict development, soil disturbance, and relocation during the interim period before remedial actions are implemented.

These measures are in accordance with specific provisions of 22 CCR §67391.1 that have been determined by the Air Force to currently be relevant and appropriate requirements. Subsections (a), (b) and (e)(2) of 22 CCR Section 67391.1 provide that if a remedy at property owned by the federal government will result in levels of hazardous substances remaining on the property at levels not suitable for unlimited use and unrestricted exposure, and it is not feasible, as is the case with the NEWIOU sites subject to LUCs, to record a land use covenant, then the ROD is to clearly define and include limitations on land use and other institutional control mechanisms to ensure that future land use will be compatible with the levels of hazardous substances remaining on the property. These limitations and mechanisms are more specifically set forth in this section of the ROD; they include annotating the residential development and soil and sediment disturbance restrictions in the Travis AFB General Plan and continuing to follow the review and approval procedures for any construction and ground-disturbing activities at NEWIOU sites with LUCs.

The Air Force will implement the following measures at all sites with land use controls.

- The Air Force will include in the Base General Plan any specific restrictions required at each site, a statement that restrictions are required because of the presence of hazardous substances, pollutants, or contaminants, the current land users and uses of the site, the geographic control boundaries, and the objectives of the land use controls. Unless a site is cleaned up to levels appropriate for unlimited use and unrestricted exposure, the Base General Plan will reflect the prohibitions on residential development (including day care centers, K-12 schools, play areas, and hospitals) and restrictions on soil and sediment disturbances. For the CAMU cover at LF007, the General Plan will include a prohibition on all activities on the cover other than operations and maintenance activities. Upon completion of a remedial action at a site, the Base will update the Base General Plan to modify the site-specific use restrictions as appropriate. The section describing the specific restrictions also will refer the reader to the Base Environmental Office if more information is needed. After remedial action is complete, the Base General Plan will be updated to include a basewide map, similar to Figure II-5-9, depicting where land use controls are in effect and site-specific maps showing in more detail the location of the LUCs within each site. The Air Force will notify the regulatory agencies when these changes are made and will send copies of the maps to the agencies. The Air Force also agrees to provide the regulatory agencies with electronic access to view the Base General Plan during regulatory visits to Travis AFB.

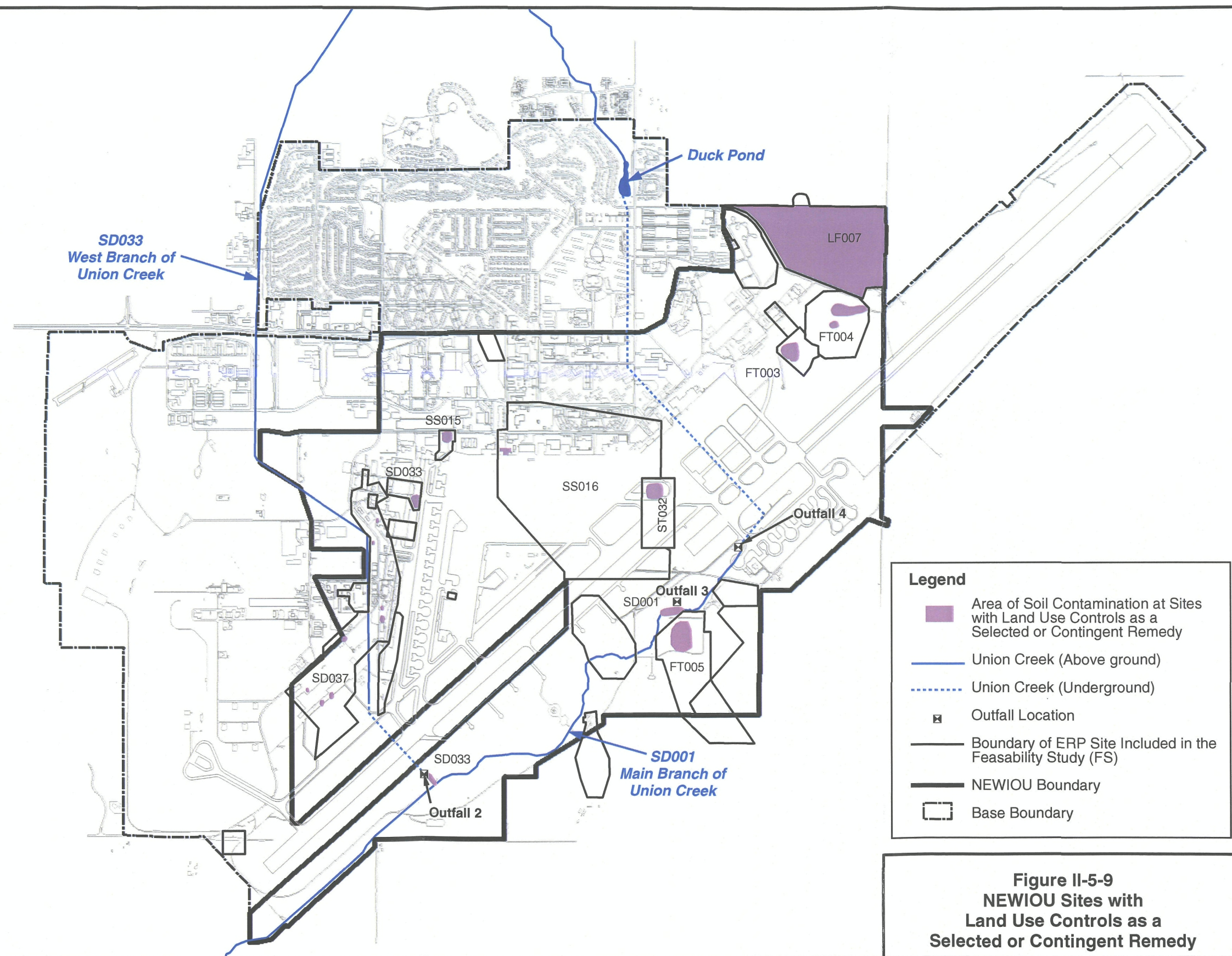
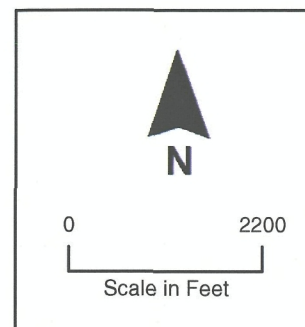


Figure II-5-9
NEWIOU Sites with
Land Use Controls as a
Selected or Contingent Remedy

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- While LUCs are in place, the Air Force will maintain existing administrative controls as more fully described in Section 5.4.1. LUCs will remain in place as long as soil contamination concentrations remain above levels allowing for unlimited use and unrestricted exposure. The Air Force will not modify or terminate LUCs, implementation actions, or modify land use without U.S. EPA and Cal-EPA/DTSC approval. The Air Force shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.
- Whenever the Air Force transfers real property that is subject to institutional controls and resource use restrictions to another federal agency, the transfer documents shall require that the federal transferee include the institutional controls and applicable resource use restrictions in its resource use plan or equivalent resource use mechanism. The Air Force shall advise the recipient federal agency of all obligations contained in the ROD, including the obligation that a State Land Use Covenant will be executed and recorded, pursuant to 22 CCR Section 67391.1, in the event the federal agency transfers the property to a non-federal entity.
- Whenever the Air Force proposes to transfer real property subject to resource use restrictions and institutional controls to a non-federal entity, it will provide information to that entity in the draft deed and transfer documents regarding necessary resource use restrictions and institutional controls, including the obligation that a State Land Use Covenant will be executed and recorded, pursuant to 22 CCR Section 67391.1. The signed deed will include institutional controls and resource restrictions equivalent to those contained in the State Land Use Covenant and this ROD.
- The Air Force will provide notice to the U.S. EPA and the State at least 6 months prior to any transfer or sale of [base or OU at issue] so that the U.S. EPA and the State can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective institutional controls (ICs). If it is not possible for the facility to notify the U.S. EPA and the State at least 6 months prior to any transfer or sale, then the facility will notify the U.S. EPA and the State as soon as possible, but no later than 60 days prior to the transfer or sale of any property subject to ICs. In addition to the land transfer notice and discussion provisions above, the Air Force further agrees to provide the U.S. EPA and the State with similar notice, within the same time frames, as to federal-to-federal transfer of property. The Air Force shall provide a copy of the executed deed or transfer assembly to the U.S. EPA and the State.
- The Air Force will notify the regulatory agencies at least 30 days in advance of any proposed land use changes that are inconsistent with land use control objectives or the selected remedy and any changes to the Base General Plan that would affect the land use controls.
- The Air Force will notify the regulatory agencies as soon as practicable, but no longer than 10 days after discovery, of any activity that is inconsistent with LUC objectives or use restrictions, or any action that may interfere with the effectiveness of LUCs, and provide the regulatory agencies within 10 days of notification of the breach, with a tentative plan (including a timeline of proposed actions and delivery dates) regarding how the Air Force will address the breach or with a description of how the Air Force has addressed the breach.

- The Air Force will address as soon as practicable any activity that is inconsistent with LUC objectives or use restrictions or any other action that may interfere with the effectiveness of LUCs, but in no case will initiate the process later than 30 days after the Air Force becomes aware of the breach.
- The Air Force will conduct periodic monitoring (at least annually) and take prompt action to restore, repair, or correct any land use control deficiencies or failures identified. A different monitoring schedule may be agreed upon according to the schedule provisions of the FFA, if all parties agree and if the change reasonably reflects the risk presented by the site.

The Air Force is responsible for implementing (to the degree controls are not already in place), monitoring, maintaining, reporting on, and enforcing the identified controls. If the Air Force determines that it cannot meet specific land use control requirements, it is understood that the remedy may be reconsidered and that additional measures may be required to ensure the protection of human health and the environment.

In addition to the land use controls already described for all sites, the following measures will be taken at each site where there is a LUC prohibiting disturbance of the soil and sediment without a permit unless operational requirements preclude placement of signs (such as the runway area).

- As previously agreed to in the *Basewide Soil Remedial Design/Remedial Action (RD/RA) Plan, Travis Air Force Base, California* (URS, 2002) (Soil RD/RA Plan), the Air Force will display appropriate signs to warn site visitors of potential hazards associated with surface soil contamination. As that document indicates, the signs will be posted in a conspicuous location along the perimeter of the restricted sites. The signs will be made and posted according to ANSI Z53.1 and conform to AFP 88-40, Standard Signs. If signs are to include a site map, the map will be oriented so that it is easy for users to determine their relationship to the site. The site-specific remedial design package will contain the sign design details. If there is no site-specific remedial design package for a site, the signs will display a warning that the area is controlled or that no soil disturbance activities are allowed and inform the reader to contact the Environmental Flight.
- Signs will be posted within 30 days of signing this ROD for sites where there will be no soil removal activities under this ROD. For sites where soil removal is the selected remedy, signs will be posted within 30 days of the completion of the remedial action and the determination that LUCs are required because soil contamination concentrations remain above levels allowing for unlimited use and unrestricted exposure.

In addition, to assure the regulatory agencies and the public that the Air Force will fully comply with and be accountable for the performance measures identified herein, the Air Force will timely submit to U.S. EPA and Cal-EPA/DTSC an annual monitoring report on the status of LUCs and/or other remedial actions, including the operation and maintenance and monitoring thereof, and how any LUC deficiencies or inconsistent uses have been addressed. The report also will be filed in the Information Repository (IR). The report would not be subject to approval and/or revision by U.S. EPA and the State. The annual monitoring reports will be used in preparation of the Five Year Reviews to evaluate the effectiveness of the remedy.

5.4.1 Components of the Travis AFB General Plan and Existing Administrative Procedures

The first step in restricting specific types of development at a site is to revise the Travis AFB General Plan to place constraints ensuring that these sites are never used for residential development ((including day care centers, K-12 schools, play areas, and hospitals). The Base General Plan implements "zone-like" requirements at Travis AFB. Air Force Instruction (AFI 32-7062) requires this comprehensive planning document for the establishment and maintenance of the institutional and engineering controls. The Base General Plan resides in the office of the Base community planner.

Current Base General Plan Sections 5.2.2.4 (Installation Restoration Program Sites) and 5.4.1 (On-Base Land Use) describe specific development prohibited at WABOU ERP sites. The Base General Plan will be revised to include residential development prohibitions and soil and sediment disturbance restrictions at NEWIOU ERP sites, describing any specific restrictions required at each site, a statement that restrictions are required because of the presence of pollutants or contaminants, the current land users and uses of the site, the geographic control boundaries, and the objectives of the land use controls. Unless a site is cleaned up to levels appropriate for unlimited use and unrestricted exposure, the Base General Plan will reflect the restrictions on residential development (including day care centers, K-12 schools, play areas, and hospitals) and restrictions on soil and sediment disturbance. In addition, concerning the CAMU cover at LF007, the Base General Plan will reflect that other than operations and maintenance activities, all activities on the cover are prohibited. Upon completion of a remedial action at a site, the Base will update the Base General Plan to modify the site-specific use restrictions as appropriate. The section describing the specific restrictions also will refer the reader to the Base Environmental Office if more information is needed. The Base General Plan will contain a map depicting the geographic boundaries of all NEWIOU sites where land use controls are in effect. Travis AFB will enforce these restrictions on residential development, soil and sediment disturbance, and CAMU cover activities through administrative review procedures that are already in place.

One procedure is the Air Force Form 332 (AF332) (Base Civil Engineer Work Request). This form must be submitted and approved before the start of any building project at Travis AFB. (Appendix A includes a copy of this form.) Approval of the AF332 involves the comparison of the building site with the constraints in the Base General Plan. The AF332 serves as the document for communicating any construction constraints to the appropriate offices. Any constraints at the site result in the disapproval of the form unless the requester makes appropriate modifications to the building plans. The Civil Engineer Squadron Chief of Operations is responsible for the final approval of proposed building projects through the AF332 review process.

Travis AFB will also use 60 Air Mobility Wing Form 55 (Excavation Permit) to enforce the residential development and soil and sediment disturbance restrictions. (Appendix A includes a copy of this form.) This form is also called the Base digging permit. The requester submits the permit to the Civil Engineer Squadron for any project that involves any mechanical soil or sediment excavation, such as digging trenches for underground lines or excavating soil for building foundations. The permit lists the environmental management and other support offices that review the excavation plans for approval. If constraints involving soil disturbance or worker safety exist at the excavation area, the permit describes the appropriate procedures that

will prevent unknowing exposure to soil contamination and measures the workers must implement before the start of excavation. The Civil Engineer Squadron Chief of Operations is responsible for the final approval of excavation projects through the permit review process.

Both Air Force Form 332s and digging permits are subject to an EIAP conducted pursuant to the National Environmental Policy Act (NEPA), as promulgated for the Air Force in 32 CFR 989, et. seq. The EIAP analysis is initiated when a proponent of a proposed action fills out an Air Force Form 813. A proponent of an action is required to submit the Air Force Form 332 and/or digging permit with the Air Force Form 813 so that the appropriate environmental analysis of the proposed action and alternatives to the proposed action is accomplished prior to any construction activities. The Travis AFB environmental staff (air, water, cultural and natural resources, restoration and others) and the Base community planner review Air Force Form 813s. New construction usually results in a determination that a formal publicized Environmental Assessment is necessary. The EIAP process works to ensure proposed construction sites are reviewed in accordance with the Base General Plan. The process also ensures that all environmental factors, as well as the Base's ROD LUCs, are considered in siting construction projects.

5.4.2 Residential Cleanup Levels

As stated in Section 5.3, the selected soil cleanup levels take into account the site-specific conditions, comply with CERCLA, and are protective of human health and the environment. These levels also are protective of the sensitive ecological receptors that live near the NEWIOU soil sites. However, these levels do not clear the sites for unlimited use and unrestricted exposure (residential use). Alternative 17 is a selected or contingent remedial alternative for all excavation sites because the selected cleanup levels may not be protective of human health and the environment if these sites were to be reclassified in the future as recreational or residential areas or if residual contaminated soil were later excavated and used as fill in residential or recreational areas.

Section 5.1 describes the industrial nature of the land surrounding the NEWIOU soil sites. For sites where excavation is the selected remedy, Tables II-5-3, II-5-5, II-5-7, II-5-9, II-5-11, and II-5-13 present the industrial and residential soil cleanup levels that will be used as described hereafter.

If a soil excavation achieves the residential cleanup levels at a site, then the site is available for unlimited use and unrestricted exposure, and there is no need to establish, maintain, monitor, or enforce LUCs. The regulatory agencies agree to delete requirements pursuant to Alternative 17 as a selected remedial alternative for a site in the event that the soil excavation achieves the residential cleanup levels for all COCs at the site.

It is impossible to calculate the concentrations of residual contamination at a soil site before the excavation of the estimated volume of soil is complete. There are three possibilities.

1. The excavation does not achieve results that meet the minimum specified cleanup standards, in which case the excavation will continue until the standards are met.
2. The excavation achieves results that meet the minimum specified cleanup standards, but the site will be protective for industrial uses only. Land use controls will be necessary.

3. The excavation achieves soil cleanup levels so that the site is protective for both industrial and residential use. Land use controls will not be necessary.

As further discussed in Section 5.6, if the initial soil excavation at a site achieves the selected cleanup levels but not the residential cleanup levels (possibility 2), the Air Force will consider several factors in making the decision to continue the excavation in an attempt to reach the residential cleanup goals, including the following:

- The amount of soil excavation completed;
- The concentrations of residual contaminants (and the residual risk remaining);
- The best estimate available for the additional amount of soil to be excavated to achieve protection for residential activities;
- The amount of time that an excavation crew can remain mobilized at the site;
- The remaining budget for the continuation of excavation activities;
- The remaining budget for the disposal of the additional volume of contaminated soil;
- The impact of adverse weather conditions on the project; and
- The continued impact of the project on Base activities.

The decision-making process is qualitative in nature and takes into account the progress made at all excavation sites. For example, the selected cleanup levels are achieved at both Site A and Site B. There is a small amount of funding remaining for these two projects, and the best estimate indicates that a smaller amount of additional excavation would be needed to reach residential cleanup levels at Site A. Assuming that there are no other considerations, the decision might be made to continue the excavation activities to attempt to reach residential cleanup levels at Site A and finalize the remedial action at Site B with land use controls. If the review results in the decision to finalize the cleanup action before achieving the residential cleanup levels at a soil site, Travis AFB will notify the regulatory agencies and start the application of Alternative 17 to the site.

5.5 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedies meet these statutory requirements.

5.5.1 Protectiveness of Human Health and the Environment

The selected remedies of a combination of Alternative 18 and Alternative 17 at six sites and Alternative 17 at four additional sites will protect human health and the environment by removing or isolating source areas of contamination that pose a potential risk to human health or the environment. At those sites where Alternative 18 is a selected remedy, Alternative 18 will reduce the cancer risks from exposure to 1×10^{-6} and the HI to less than 1.0 (based on U.S. EPA Region 9 PRGs). This level falls at the lower end of U.S. EPA's target risk range of 10^{-4} to 10^{-6} . Alternative 17 will prevent recreational and residential use of the sites and use of soil and sediment at the sites for residential fill. There are no short-term threats associated with the selected remedies that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the selected remedies.

5.5.2 Applicable or Relevant and Appropriate Requirements

The selected remedies of excavation and land use controls comply with all ARARs presented in more detail in Tables II-6-1 through II-6-6. Concerning chemical-specific ARARs, following lengthy negotiations with the regulatory agencies encompassing both the previously executed WABOU Soil ROD and this NEWIOU SSSW ROD, the Air Force accepted the U.S. EPA's recommendation to use the current PRGs (Smucker, 2004) as a basis for soil cleanup levels for carcinogenic chemicals that equate to a fixed level of risk (1×10^{-6}) and for non-carcinogenic chemicals that equate to a fixed level of risk (HI=1). PRGs are TBCs and not ARARs. The Air Force accepted human health cleanup levels based on PRGs for NEWIOU soil and sediment sites because most sites have multiple contaminants and a cumulative risk that needs to be addressed. While using PRG-based cleanup levels potentially results in cleanup levels more conservative than required, Travis AFB determined that its site-specific situations with multiple contaminants justified accepting PRG-based cleanup levels.

5.5.3 Cost-Effectiveness

In the Air Force's judgment, the selected remedies are cost-effective and represent a reasonable value for the money to be spent. In making this determination, the following definition was used "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness. (NCP Section 300.430(f)(1)(ii)(D))." This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the selected remedial alternatives was determined to be proportional to their costs and, hence, to represent a reasonable value for the money to be spent. The selected remedies for implementing the soil and sediment remedial actions at each site include the most cost-effective alternatives that can meet the NEWIOU RAOs. Section 5.3 presents the details of the alternative selection.

5.5.4 Use of Permanent Solutions, Alternative Treatments, or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedies represent the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at each site. The selected remedies provide the best balance of trade-offs in terms of the five balancing criteria, while considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal, and also considering state and community acceptance. For the NEWIOU soil sites, innovative technologies, such as thermal treatment, were considered. However, difficulties associated with implementability or excessive cost rendered less innovative technology, such as excavation and disposal, and land use controls more favorable. The selected remedies satisfy the criteria for long-term effectiveness by removing contamination from soil to at least industrial levels at 6 sites and by implementing land use controls in the event that the soil excavation does not clear the sites for unlimited use and unrestricted exposure (residential use) for all COCs at the site. At 4 sites, land use controls alone satisfy the criteria for long-term effectiveness.

5.5.5 Preference for Treatment as a Principal Element

Remedies that treat contamination were considered. However, for the NEWIOU soil sites, excessive cost made treatment impractical when compared to excavation and disposal.

5.5.6 Five-Year Review Requirements

Because these remedies will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted after initiation of the final remedial action to ensure that the remedies are or will be protective of human health and the environment.

5.6 RD/RA Implementation and Schedule

The Air Force will implement the RD/RA for the 18 NEWIOU soil, sediment, and surface water sites in accordance with this NEWIOU SSSW ROD. In accordance with the Travis AFB FFA, the Air Force will present the NEWIOU RD/RA schedule for completing and submitting the site-specific RD planning and design documents to the regulatory agencies within 21 days of signing the NEWIOU SSSW ROD.

The NEWIOU RD/RA schedule is a product of the Travis AFB ERP Priority Model and the Travis AFB Strategic Plan. The Priority Model and the Strategic Plan are planning tools used by Travis AFB to prioritize funding and schedule remedial actions for ERP sites. They take into account factors such as human health risk, off-base migration, CAMU coordination issues, ecological risk, public interest, capital cost, project execution, and projected funding levels.

The Air Force has prepared the final *Basewide Soil Remedial Design/Remedial Action (RD/RA) Plan, Travis Air Force Base, California* (Soil RD/RA Plan) (URS, 2002), which addresses the implementation of soil remedial actions for all Travis AFB soil sites. It provides the procedures for conducting a soil excavation, for transportation, and for either placement in the CAMU or disposal in an appropriate off-base landfill. It addresses the following issues.

- The identification and filling of potential site characterization data gaps.
- The analytical methods and quality assurance/quality control procedures that will be used to characterize soil contaminants and confirm the attainment of cleanup levels during excavation.
- The procedures for conducting soil excavations. This includes procedures for sample collection and selection of sampling methods. This also includes the consideration of factors needed to make the site-specific decisions for continuing an excavation to attempt to reach residential cleanup goals.
- The sampling rationale for waste characterization prior to disposal. This includes the number of samples collected at each site and the methodology used for their collection. This also includes the procedures to be used to segregate heavily contaminated soil that needs to be transported off base for disposal and the less contaminated soil that can be placed in the CAMU.
- A detailed description of the CAMU, to include the procedures for segregating soil by contaminant type, decontamination procedures, sampling protocols, and inspection and maintenance requirements.

The Air Force will prepare an RD and RA work plan for each NEWIOU excavation site. Each RD and RA work plan will present excavation requirements, precautions needed to protect nearby sensitive habitats, truck routes to enter and exit the site, and all other site-specific information needed to complete the remedial action. RD and RA work plans are primary documents under the Travis FFA and will be reviewed by the regulatory agencies.

The RD/RA phases will use the soil and/or sediment cleanup levels listed in Tables II-5-3, II-5-5, II-5-7, II-5-9, II-5-11, or II-5-13 to accomplish the following.

- Estimate the target volumes that require remediation, which is an important input for the RD.
- Verify that the analysis of the confirmation samples collected during the RA can achieve the quantitation limits required by the appropriate Travis AFB Quality Assurance Project Plan.
- Measure the progress of the RA through comparison with the field analytical data and determine when the RA is complete.

The Air Force will monitor the progress of each soil remedial action until the soil cleanup levels are achieved. Then, the Air Force will review the results of the confirmation sample analysis and other site-specific conditions, as described in Section 5.4.2, and decide whether the RA should continue to attempt to reach residential cleanup goals and avoid the need to implement land use controls. The Air Force will keep the regulatory agencies informed of these decisions.

5.7 Site Closure

Within 60 days of the final inspection of the constructed remedy, the Air Force will submit an RA report to the regulatory agencies. This report will describe the RA and document the amount of excavated soil removed from the site, the disposition of the excavated soil (placement in the on-base CAMU or disposal in an off-base landfill), and the analytical results of the confirmation sampling. Table II-5-2 lists the soil and leachate acceptance levels for the CAMU at LF007. For soils that have been placed in the CAMU, the report will document the results of acceptance level sampling and analysis. Figures will show the aerial and, if necessary, the vertical extent of the excavation area.

5.8 Documentation of Significant Changes

There have been significant changes to the selected remedies since the Air Force submitted the *North/East/West Industrial Operable Unit, Travis Air Force Base, Proposed Plan for Soil, Sediment, and Surface Water* (Travis AFB, 1998a) for public comment on 8 July 1998. The NEWIOU SSSW Proposed Plan took a conservative approach and assumed that all but two of the sites may require excavation. After completion of the NEWIOU SSSW Proposed Plan, the planning effort at Travis AFB focused on the implementation of basewide interim groundwater remedial actions and the development of the WABOU Soil ROD (Travis AFB, 2002a). When the WABOU Soil ROD was completed in December of 2002, Travis AFB work resumed on the NEWIOU SSSW ROD. This effort included detailed site-by-site presentations and discussions with regulatory agencies on human health considerations, a more current sampling of the creek, and a new ERA. Based on this effort and experience from the WABOU Soil ROD, RODs, and RAs, it appeared that at many of the NEWIOU sites, excavation was not necessary. Specifically, Sites FT002, OT010, SS015, SS016, WP017, SS029, SS030, ST032, SS035, and SD037 had excavation as the proposed remedy in the NEWIOU SSSW Proposed Plan and now will have a selected action of "No Action" or "Land Use Controls." For two sites, SD034 and SD036, which had land use controls or natural attenuation as the preferred alternative in the NEWIOU SSSW Proposed Plan, it was subsequently determined that the preferred alternative should be "No Action." These selected actions are shown in Table II-5-15 and were all identified as remedial alternatives in the Proposed Plan. The rationale for the final remedy selected in this ROD is provided in Section 5.3. Additional data are available in the Human Health, Eco, and Groundwater Protection Tech Memos.

The Air Force provided the public notice and opportunity to comment on these changes in a 2006 fact sheet, a 2006 supplemental handout, and during a public meeting held on 26 January 2006.

One seeming variance not discussed in the January 2006 public meeting, fact sheet, or supplemental handout between the NEWIOU SSSW Proposed Plan and the remedy selection in this ROD is the selection of "No Action" for surface water at SD001 and SD033, rather than "Source Control." As explained in Section 5.1.1 and in footnote c to Tables I-3 and II-5-15, the NEWIOU SSSW Proposed Plan proposed "Source Control" (groundwater pump and treat) for surface water at SD001 and SD033, indicating Union Creek is not a source of contamination, but that the creek may be receiving TCE-contaminated water from groundwater through storm sewer infiltration. Subsequent to the NEWIOU SSSW Proposed Plan, extraction and treatment

of contaminated groundwater was implemented as part of the WABOU and NEWIOU Groundwater IRODs. As "Source Control" has already been implemented for surface water at SD001 and SD033, "No Action" will be implemented under this ROD for surface water at these sites. While the name of the selected remedy has changed, the "No Action" remedy is not different from what is described as "Source Control" in the NEWIOU SSSW Proposed Plan, in terms of actual actions to be taken under this ROD. The NEWIOU SSSW Proposed Plan indicated that source control would be accomplished under the groundwater IRODs, and source control is, in fact, now being accomplished under the groundwater IRODs. "Source Control," as described in the NEWIOU SSSW Proposed Plan, did not envision an affirmative action regarding surface water in the NEWIOU SSSW ROD. Thus, "No Action" more accurately labels the selected remedy for surface water under this ROD and is not a significant change in remedy.

6.0 List of Applicable or Relevant and Appropriate Requirements and Performance Standards

6.1 Overview

Under CERCLA, remedial actions designed to clean up or abate contaminants in the ground-water or in soil, sediment, and surface waters must be designed, constructed, and operated to comply with all federal and more stringent state ARARs. ARARs include both federal requirements under any federal environmental law and state requirements under state environmental or facility siting laws that are more stringent than federal requirements and that have been identified by the State of California in a timely manner.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements include those that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, nevertheless address problems or situations sufficiently similar to those encountered at the CERCLA site to indicate their use is well suited to the particular site. If a given requirement is both relevant and appropriate to a particular site, it constitutes a valid legal requirement for that site. A requirement must either be applicable or both relevant and appropriate to be an ARAR. If no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then non-promulgated standards, criteria, guidance, and TBC advisories are identified as additional performance standards in a ROD.

In general, on-site actions need to comply with only the substantive aspects of these requirements, not with corresponding administrative requirements (such as, but not limited to, permits, recordkeeping, and reporting).

All laws and statutes identified as ARARs for a particular site or action must be considered and applied during the design, construction, and operation of any remedial action at the particular site. ARARs are identified on a site-specific basis from data and information concerning that site. Data and information concerning the objectives of site remediation, specific actions that are being considered as remedies at that site, the hazardous substances located on the site, the physical and geological characteristics of the site, and the potential human and ecological receptors at or near the site must be analyzed and considered to properly identify ARARs at a particular site. All federal and more stringent state requirements that address or impact any of these conditions must be included as site ARARs.

The three categories of ARARs are described hereafter.

- Chemical-specific ARARs establish numerical values or provide methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These ARARs are developed by identifying the contaminants at a site that pose a threat to human health or the environment and that must be remediated. Chemical-specific ARARs determine acceptable concentrations of specific hazardous substances, pollutants, and contaminants in the environment and establish the levels to which the soil or groundwater at the affected site must be cleaned or restored to protect human health and the environment. Chemical-specific ARARs also establish the levels at which certain actions must be taken while transporting, treating, or storing hazardous wastes recovered during remediation.
- Location-specific ARARs are designed to protect the unique characteristics of the site or other areas potentially affected by site activities during the design, construction, or operation of remedial activities. Location-specific ARARs place restrictions on the concentrations of hazardous substances or the conduct of activities solely because the site occurs in, or may affect, a special location. Some examples include the protection of wetlands and vernal pools; protection of endangered or threatened species and their habitats; and the protection of fish and game from unauthorized taking.
- Action-specific ARARs are technologically or activity-based requirements or limitations on the particular remedial actions at the site. Some examples include prohibitions or restrictions against the discharge of chemicals or contaminants to the air, water, or soil and the proper transfer, treatment, or storage of chemicals and contaminants.

6.2 ARARs Identification, Development, and Evaluation

6.2.1 Methodology

As the lead agency, the Department of the Air Force has performed, in consultation with the U.S. EPA, each of the following actions consistent with CERCLA, the NCP, and the Travis AFB FFA.

- Identified federal ARARs for each remedial action alternative addressed in the NEWIOU FS, taking into account site-specific conditions found in the NEWIOU.
- Reviewed potential state ARARs identified by the State to determine whether each potential ARAR satisfied CERCLA and NCP criteria that must be met to qualify as state ARARs.
- Evaluated and compared federal ARARs and their state counterparts to determine which state ARARs are more stringent or are an addition to the federal ARARs.
- Reached a conclusion as to which federal and state requirements were the most stringent ARARs for each selected alternative.

6.2.2 Solicitation, Identification, and Evaluation of State ARARs

The Department of the Air Force followed the procedures of the process set forth in 40 CFR, Section 300.515, and the Travis AFB FFA for remedial actions in seeking state assistance in

identification of state ARARs. The CERCLA, NCP, and FFA requirements for remedial actions provide that the lead federal agency request that the State identify chemical-specific and location-specific state ARARs. The lead agency requested chemical-, location-, and action-specific ARARs from Cal-EPA/DTSC on 20 February 1997. The request letter included, as an attachment, the ARARs tables developed during the NEWIOU FS. These tables were developed using responses from the following:

- California Integrated Waste Management Board;
- Cal-EPA/DTSC;
- State Water Resources Control Board;
- California RWQCB;
- Bay Area Air Quality Management District (BAAQMD); and
- CDFG.

During the review and analysis of ARARs identified by the State, and following considerable discussion with the representatives from the various state agencies, many of the requirements identified by the State as potential ARARs were determined to be valid ARARs by the lead agency. The NEWIOU FS (Radian, 1996b) including ARARs, was finalized on 12 September 1997 with agency concurrence. These ARARs became the basis of ARARs in the subsequent NEWIOU Groundwater IROD (Travis AFB, 1997), WABOU FS (CH2M HILL, 1998a), WABOU Groundwater IROD (Travis AFB, 1998b), and the WABOU Soil ROD (Travis AFB, 2002a) with very few minor changes to suit the specific sites and media addressed in each document. Draft ARARs tables for NEWIOU soil, sediment, and surface water sites were developed from these previous tables of ARARs, updated to reflect any changes in regulations, and submitted to the U.S. EPA, Cal-EPA/DTSC, and San Francisco Bay RWQCB on 28 February 2002. Agency comments were subsequently provided and discussed in various remedial program manager (RPM) meetings. Upon review of the ARARs tables for inclusion in this ROD, in an effort to make this ROD somewhat more brief, the Air Force decided to not re-list the numerous ARARs applicable to the CAMU because those requirements are already set forth in the WABOU Soil ROD. The ARARs applicable to the CAMU that were set forth in the WABOU Soil ROD also apply to the remedial actions involving the CAMU taken pursuant to the NEWIOU SSSW ROD, and they are incorporated by reference into this ROD.

6.3 Determination of ARARs

This section identifies those requirements applicable or relevant and appropriate to soil, sediment, and surface water remediation; those that had no relevance were excluded from consideration. Specifically excluded were the following.

- Location-specific requirements addressing conditions not present at NEWIOU remediation sites;
- Chemical-specific requirements for COCs not present at NEWIOU remediation sites; and

- Action-specific requirements for remedial alternatives not used at NEWIOU remediation sites.

The ARARs for NEWIOU soil, sediment, and surface water sites and remedial actions, except those included in the WABOU Soil ROD concerning the CAMU, are listed in Tables II-6-1 through II-6-6 (all tables come at the end of this section).

6.4 Action-Specific ARARs

These ARARs place restrictions on remedial activities that may negatively impact the surrounding environment. The potential NEWIOU soil, sediment, and surface water remedial alternatives were analyzed to identify potential impacts to the environment. Those considered are discussed in the following sections.

6.4.1 Hazardous Waste Treatment, Storage, and Disposal Requirements

These requirements are technology- or activity-based requirements that place limitations on actions taken with respect to the hazardous waste. Regulations promulgated under the applicable provisions of the state-authorized federal RCRA and the more stringent provisions of the California Hazardous Waste Control Law (HWCL) are relevant and appropriate to RCRA-permitted storage facilities and the proper characterization of hazardous waste and storage and disposal of such waste. If any hazardous wastes are identified that will be transported off site, they will be disposed of and handled under applicable provisions of the state-authorized federal RCRA program. Many of the HWCL provisions are either applicable or relevant and appropriate because they describe requirements for the safe handling of contaminated materials and precautions for preventing further contamination. These requirements are identified in Tables II-6-1, II-6-2, II-6-3, and II-6-4.

6.4.2 Water Resources Requirements

The Porter-Cologne Water Quality Control Act (PCWQCA) is one of the statutory bases for regulation of discharges of waste to land that could impair either surface water or groundwater quality in California. It establishes the authority of the state, through its regional water quality control boards, to protect the quality of the surface water and ground water. Under the authority of the PCWQCA, the RWQCB developed the San Francisco Bay Basin Plan. The RWQCB considers Chapter 2 of the Plan (beneficial uses), Chapter 3 (water quality objectives) and Chapter 4 (implementation plan) to be soil ARARs. The Air Force and U.S. EPA do not agree that these Basin Plan Chapters should be soil ARARs in this soil ROD.

Travis AFB and the regulatory agencies have used the MCLs that are included as water quality objectives in the Basin Plan as one factor in the development of soil acceptance levels for the CAMU. This process, and the resulting acceptance criteria, are described in the *Corrective Action Management Unit Soil Acceptance Criteria* Technical Memorandum (Radian, 2001). U.S. EPA has concurred with the procedures set forth in this technical memorandum, including the levels set for soil acceptance. However, the Air Force does not agree that the Basin Plan chapters put forth by the Water Board should be considered ARARs for the CAMU. The U.S. EPA concurs that the Basin Plan chapters should not be considered ARARs for the CAMU.

In the Air Force's and U.S. EPA's view, the appropriate ARARs for the CAMU are the RCRA CAMU requirements set forth in 40 CFR 264.551 (previously 264.552) and adopted by the State of California in 22 CCR 66264.552(c). These regulations include the following narrative requirements for creation of a CAMU: (1) The CAMU shall facilitate the implementation of reliable, effective, protective, and cost-effective action measures; and (2) waste management activities associated with the CAMU shall not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes, hazardous substances, or hazardous constituents. Thus, Travis AFB and regulatory agencies, in implementing these criteria, used the MCLs as a guide in setting the CAMU soil acceptance levels, to achieve protectiveness and eliminate unacceptable risks to the underlying groundwater. (U.S. EPA's more recent CAMU regulation allows a facility to use the CAMU regulations discussed above if a substantially complete CAMU proposal was submitted prior to 20 November 2000. See 67 Fed. Reg. 2961, 22 January 2002; 40 CFR 264.550[b].) The regulatory agencies have concurred that Travis AFB met the substantive portion of this requirement prior to the deadline.)

State requirements are considered to be ARARs only when they are more stringent than federal requirements. The CAMU regulations, being part of the federally authorized RCRA program, are considered by the Air Force and the U.S. EPA to be federal requirements. The Air Force and U.S. EPA do not consider the Basin Plan to be more stringent than the CAMU regulations for the purpose of this remedial action.

Travis AFB has not yet selected ARARs for any remedial action that might be necessary for the groundwater underlying the CAMU. Thus, the MCLs have not been determined to be relevant and appropriate for the groundwater. For this reason, also, the Air Force and U.S. EPA do not consider it appropriate to select the MCLs as ARARs for the CAMU.

Because Travis AFB, U.S. EPA, and the State have all previously concurred on the CAMU acceptance criteria and the procedure used to determine those criteria in the WABOU Soil ROD, all the parties have agreed not to initiate a dispute under the FFA regarding whether the Basin Plan should be considered an ARAR for the remedial actions related to the CAMU. This ROD will be amended accordingly if the Air Force subsequently determines that the Basin Plan is an ARAR.

6.5 Location-Specific ARARs

These ARARs place restrictions on remedial activities that may be conducted on site because of the presence of unique site features. The location of the NEWIOU soil, sediment, surface water, and groundwater sites and surrounding areas were analyzed for unique site features to identify ARARs. The unique site features considered are discussed hereafter.

Habitats of Rare, Threatened, Endangered, and Special-Status Species

Vernal pools that may contain an endangered species, including the Vernal Pool Tadpole Shrimp and the Vernal Pool Fairy Shrimp, have been identified. Other endangered species, including the Black-Shouldered Kite, Boggs Lake Dodder, Burrowing Owl, Coopers Hawk, California Gull, Golden Eagle, Loggerhead Shrike, Northern Harrier, Red Fox, Tri-Colored Blackbird, Contra Costa Goldfields, Northwestern Pond Turtle, and San Francisco Forktail Damselfly have been observed at least once at Travis AFB and have the potential to be found at NEWIOU sites. Several more stringent state ARARs protective of site ecology also have been

identified. The California Fish and Game Code (CFGC) and regulations promulgated under this Code protect rare, endangered, or threatened species or habitats and require alternative actions at sites where impacts have the potential to occur. In addition to these state counterparts to the Endangered Species Act, the CFGC also establishes several requirements to protect site wildlife by prohibiting or restricting the unauthorized taking of other wildlife. The CFGC also regulates to protect aquatic life in the waters of the state. All remedial activities that have the potential to cause a discharge to any stream, lake, or other body of water must comply with the requirements of the CFGC. Table II-6-5 presents the CFGC ARARs. Several federal ARARs were identified that impact site ecology. The Endangered Species Act and implementing regulations set forth in Table II-6-6 apply to those remedial actions at NEWIOU sites where impacts to endangered wildlife could occur. To ensure that regulatory requirements are followed and impacts are avoided or mitigated, all sites will be surveyed for the presence of these resources immediately before beginning remedial activities. This survey will begin after all necessary site-specific data concerning the execution of soil, sediment, and surface water RAs become available.

6.6 Chemical-Specific Cleanup Levels (Based on TBCs)

The soil sites in the NEWIOU are contaminated primarily with SVOCs, fuels, PCBs, PAHs, dioxins, pesticides, and metals. Sediment sites are primarily contaminated with PAHs. As previously explained, following lengthy negotiations with the regulatory agencies encompassing both the previously executed WABOU Soil ROD and this NEWIOU SSSW ROD, the Air Force accepted the U.S. EPA's recommendation to use the current PRGs (Smucker, 2004) as a basis for soil cleanup levels for carcinogenic chemicals that equate to a fixed level of risk (1×10^{-6}) and for non-carcinogenic chemicals that equate to a fixed level of risk ($HI = 1$). As also previously discussed, PRGs are TBCs and not ARARs. The Air Force accepted human health cleanup levels based on PRGs for NEWIOU soil and sediment sites because most sites have multiple contaminants and a cumulative risk that needs to be addressed. Surface water cleanup levels were not developed because Alternative 10 (No Action) is the selected alternative for surface water sites. While using these PRGs potentially results in cleanup levels more conservative than required, Travis AFB determined that its site-specific situations with multiple contaminants justified accepting PRG-based cleanup levels. Travis AFB estimated the expense of justifying less conservative cleanup levels to the regulators in terms of time and money and ultimately determined that accepting the PRG-based cleanup levels will result in minimal incremental cleanup costs. This determination is applicable to the sites with PCB concentrations. This approach has already worked well under the WABOU Soil ROD. Cleanup levels based on PRGs will be used unless there are site-specific considerations that justify a less stringent cleanup level. In this ROD, there are no sites where a less stringent cleanup level was used.

Table II-6-1

Travis AFB - NEWIOU Soil Sites

State ARARs

California Department of Toxic Substances Control Requirements

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
Title 22 CCR, Div 4.5, Chapter 39	67391.1(a), (b), (d), (e)(2), (f) and (i)	Relevant and Appropriate	Provides that if a remedy at property owned by the federal government will result in levels of hazardous substances remaining on the property at levels not suitable for unlimited use and unrestricted exposure, and it is not feasible to record a land use covenant, then the decision document will clearly define and include limitations on land use and other institutional control mechanisms to ensure future land use will be compatible with the levels of hazardous substances remaining on the property.	Pertains to sites with land use controls.	SD001 FT003 FT004 FT005 LF007 SS015 SS016 ST032 SD033 SD037	17
Title 22 CCR Chapter 12, Article 1	66262.11	Applicable	Requires a facility to make a determination as to whether waste is hazardous.	Applicable to wastes excavated or resulting from treatment processes.	SD001, FT003, FT004, FT005, LF007 SD033	18
Title 22 CCR Chapter 18, Article 1 (Land Disposal Restrictions - General)	66268.3	Applicable	Establishes land disposal restrictions, including a prohibition of using dilution as a substitute for treatment.	Applicable to hazardous wastes generated from site excavation activities. Restricts on-site disposal activities in unauthorized areas. Section 66268.7, paragraphs (a)(1), (b)(1)(2) and (3), and (c)(2) are substantive requirements. The remainder of the section is procedural and not ARARs.	SD001, FT003, FT004, FT005, LF007 SD033	18
	66268.7	Applicable	Establishes land disposal restrictions, including requirements for waste analysis and record keeping.			

ARAR = applicable or relevant and appropriate requirements
CCR = California Code of Regulations

NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision

Table II-6-2

Travis AFB - NEWIOU Soil Sites

Federal ARARs*

Waste Transfer, Treatment, Storage, and Disposal Requirements

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
*Title 22 CCR Chapter 18, Article 1	66268.9	Applicable	Establishes land disposal restrictions and special rules for wastes exhibiting a characteristic.	Applicable to hazardous wastes generated from site excavation activities. Restricts on-site disposal activities in unauthorized areas. Section 66268.7, paragraphs (a)(1), (b)(1)(2) and (3), and (c)(2) are substantive requirements. The remainder of the section is procedural and not ARARs.	SD001, FT003, FT004, FT005, LF007, SD033	18
*Title 22 CCR Chapter 18, Article 2	All Sections	Applicable	Establishes treatment technology for disposal of waste to land for RCRA and non-RCRA wastes identified in Section 66268.106.	Applicable to sites where excavated material is classified as hazardous waste or state-regulated waste. Wastes identified will be managed in accordance with these standards.	SD001, FT003, FT004, FT005, LF007, SD033	18

Note: The ARARs applicable to the CAMU that were set forth in Travis AFB's December 2002 WABOU Soil ROD (Travis AFB, 2002a) also apply to the remedial actions involving the CAMU taken pursuant to this NEWIOU SSSW ROD, and those requirements are incorporated by reference into this ROD.

* California statutes and regulations comprising federal authorized RCRA program.

ARAR = applicable or relevant and appropriate requirements
 CAMU = Corrective Action Management Unit
 CCR = California Code of Regulations
 NEWIOU = North/East/West Industrial Operable Unit
 RCRA = Resource Conservation and Recovery Act
 ROD = record of decision
 SSSW = soil, sediment, and surface water
 WABOU = West/Annexes/Basewide Operable Unit

Table II-6-3

Travis AFB - NEWIOU Soil Sites

State ARARs

Water Board Requirements

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
State Water Resources Control Board Order 99-08-DWQ	A (Discharge Prohibitions), B (Receiving Water Limitations), Section A (Storm Water Pollution Prevention Plan – para. 1, 5 thru 11)	Relevant and Appropriate	Requires control of storm water runoff discharges at construction sites that are equal to or greater than one acre in size, including clearing, grading, and excavation activities to be minimized using Best Available Technology Economically Achievable (BAT).	The substantive portions of these paragraphs are applicable to soil removal activities at sites listed. The permitting requirement is not an ARAR.	FT003, FT004, FT005, LF007,	18

ARAR = applicable or relevant and appropriate requirements

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Table II-6-4

Travis AFB - NEWIOU Soil Sites

State ARARs

BAAQMD Air Remediation Requirements

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
Regulation 6	301	Applicable	Establishes limitations on visible emissions and opacity.	Applicable to sites where excavation or construction activities have the potential to release particulate matter into the air (i.e., dirt and dust), or to sites where portable soldering, brazing, or welding equipment is used. Also applicable at sites where portable combustion engines of < 25 liters of displacement are used.	SD001, FT003, FT004, FT005, LF007, SD033	18
	302	Applicable	Establishes limitations on opacity.			
	303	Applicable	Establishes limitations on emission rates, concentration, visible emissions, and opacity.			
	501	Applicable	Establishes requirements for sampling facilities and instruments.	Applicable to all actions subject to Regulation 6.		

ARAR = applicable or relevant and appropriate requirements

BAAQMD = Bay Area Air Quality Management District

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Table II-6-5

Travis AFB - NEWIOU Soil Sites

State ARARs

Fish and Game Requirements

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
California Fish and Game Code	1908	Applicable	Prohibits the import, taking or possession of rare or endangered native plants.	Applicable to active remediation sites where rare or endangered native plants exist.	SD001, FT003, FT004, FT005, LF007, SD033	18
	2080	Applicable	Prohibits the import, taking or sale of threatened or endangered native plants.	Requires site surveys prior to action to determine presence of endangered/ threatened plants at the site and consideration of potential impact. Relevant and appropriate for federal agencies at all sites where endangered or threatened species are located. Requires coordination and, if appropriate, consideration of alternative actions at sites where impact to endangered or threatened species may occur. Will be considered at all sites where active remediation occurs.		
	2090	Relevant and Appropriate	Requires state lead agencies to consult with CDFG to ensure authorized actions will not jeopardized endangered or threatened species.			
	2091	Relevant and Appropriate	Requires state agencies to use alternative actions if impact to threatened or endangered species or habitat is found.			
	2092	Relevant and Appropriate	Requires state agencies to adopt reasonable alternative actions where project would result in the extinction of a species.			
	3005	Applicable	Prohibits taking of birds or animals with net, pound, cage, trap, set line, wire, or poison.	Applicable at all remediation sites where birds, mammals, or other animals and wildlife identified by the applicable statutory provision exist.		
	3511	Applicable	Prohibits taking of birds identified as "fully protected."			
	3513	Applicable	Prohibits taking of mammals that are identified as "fully protected."			

Table II-6-5 (Cont'd)

Travis AFB - NEWIOU Soil Sites

State ARARs

Fish and Game Requirements

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
California Fish and Game Code (cont'd)	4700	Applicable	Prohibits taking or possession of mammals identified as "fully protected."	Note: These sections are applicable to the extent that the state law is more strict than the Federal Endangered Species Act or Migratory Bird Treaty Act. For example, in those cases where a species is listed as "fully protected" but not identified as federally endangered or protected, then the state law is applicable.	SD001, FT003, FT004, FT005, LF007, SD033	18
	5050	Applicable	Prohibits taking or possession of reptiles and amphibians identified as "fully protected."			
	5515	Applicable	Prohibits taking or possession of fish identified as "fully protected."			
	5650	Applicable	Prohibits deposit or placement of specified materials and substances into places where they can pass into the waters of the state.			

ARAR = applicable or relevant and appropriate requirements

CDFG = California Department of Fish and Game

NEWIOU = North/East/West Industrial Operable Unit

ROD = record of decision

Table II-6-6

Travis AFB - NEWIOU Soil Sites

Federal ARARs

Requirements Under the U.S. Code and Related Regulations

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
Title 16 USC (Endangered Species Act)	1531(c)	Applicable	Requires action to conserve endangered species and critical habitats upon which endangered species depend. Includes consultation with the Department of Interior.	Activities at all remedial sites must be performed in such a way as to identify the presence of and to protect endangered or threatened plants and animals at the site. Species at Travis AFB include the Black-Shouldered Kite, Boggs Lake Dodder, Burrowing Owl, Coopers Hawk, California Gull, Golden Eagle, Loggerhead Shrike, Northern Harrier, Red Fox, Tri-Colored Blackbird, Vernal Pool Fairy Shrimp, Contra Costa Goldfields, Vernal Pool Tadpole Shrimp, Northwestern Pond Turtle, and San Francisco Forktail Damselfly.	SD001, FT003, FT004, FT005, LF007, SD033	18
	1536(a)	Applicable				
Title 16 USC (Migratory Bird Treaty Act)	703	Applicable	Prohibits unlawful taking, possession, and sale of almost all species of native birds in the U.S.	Species at Travis AFB include Black-Shouldered Kite, Burrowing Owl, Coopers Hawk, California Gull, Golden Eagle, Loggerhead Shrike, Northern Harrier, and Tri-Colored Blackbird.	SD001, FT003, FT004, FT005, LF007, SD033	18

Table II-6-6 (Cont'd)

Travis AFB - NEWIOU Soil Sites

Federal ARARs

Requirements under the U.S. Code and Related Regulations

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
Federal Clean Water Act, Section 404, Title 33 CFR Part 330, Appendix A, Subpart B, Army Corps of Engineers Nationwide Permit Programs	Para 27	Applicable	Establishes requirements for activities in waters of the United States associated with the restoration of altered and degraded non-tidal wetlands and creation of wetlands on private lands.	The substantive portions of these paragraphs are applicable to activities related to construction and installation of remedial equipment. The permitting requirements are not ARARs.	SD001, LF007, SD033	18
Federal Clean Water Act, Section 404, Title 33 CFR Part 330, Appendix A, Subpart C, Army Corps of Engineers Nationwide Permit Conditions (NWP)	Para 2	Applicable	Requires any structure or fill authorized be properly maintained, including maintenance to ensure public safety.	The substantive portions of these paragraphs are relevant and appropriate. The notification requirements are not ARARs. Site activities related to construction and installation of remedial equipment give rise to these requirements.	SD001, LF007, SD033	18
	Para 4	Applicable	Requires that no activity may substantially disrupt the movement of those species of aquatic life indigenous to the water body.			
	Para 5	Applicable	Requires heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.			

Table II-6-6 (Cont'd)

Travis AFB - NEWIOU Soil Sites

Federal ARARs

Requirements under the U.S. Code and Related Regulations

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
40 CFR Part 230 (Clean Water Act - Disposal of Dredged or Fill Material)	230.10	Applicable	Prohibits discharge of dredged or fill material into waters or wetlands without a permit. Establishes limits on discharges.	Applicable to sites where wetlands and vernal pools are located. Permitting requirements are not applicable to CERCLA sites and are not ARARs.	SD001, LF007, SD033	18
	230.71	Applicable	Places limitations/requirements on the disposal and treatment of the dredged or fill material discharged.			
	230.72	Applicable	Establishes requirements and methods for the control of the effects of dredged or fill material after discharge, through use of levees, caps, lined containment areas, timing and placement.			
	230.73	Applicable	Establishes requirements for minimizing discharge effects by use of specific disbursement methods.			
	230.74	Applicable	Requires use of available technology, adapted to the particular site, to minimize adverse effects of dredge and fill discharges.			
	230.75	Applicable	Requires minimization of adverse effects on populations of plants and animals from the discharge of dredge/fill materials.			
	230.76	Applicable	Requires use of fill or dredge material discharge methods that minimize the adverse effects on human use potential.			

Table II-6-6 (Cont'd)

Travis AFB - NEWIOU Soil Sites

Federal ARARs

Requirements under the U.S. Code and Related Regulations

North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Source	Requirement, Standard, or Criterion	Type	Description	Remarks	Sites and Alternatives	
40 CFR 745.65(c) (Soil lead hazard on residential property)	745.65(c)	Relevant and Appropriate	Establishes a hazard standard of 400 ppm for residual lead in bare soil for children's play areas.	Applicable to sites where the residual lead concentration in the soil exceeds 400 ppm.	FT002, FT003, FT004, SS015, SD033, SD037	17

ARAR = applicable or relevant and appropriate requirements

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

CFR = Code of Federal Regulations

NEWIOU = North/East/West Industrial Operable Unit

ppm = parts per million

ROD = record of decision

USC = United States Code

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APPENDIX A

Travis AFB Work Coordination Forms

Air Force Form 332
Base Civil Engineer Work Request

BASE CIVIL ENGINEER WORK REQUEST <i>(See Reverse for Instructions)</i>				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average .2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the Department of Defense, Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project 0704-0188, Washington DC 20503. Please DO NOT RETURN your form to either of these addresses. Send your completed form to HQ AFESC/DENG.					
SECTION I - TO BE COMPLETED BY REQUESTER					
1. FROM (Organization)		2. OFFICE SYMBOL	3. DATE OF REQUEST		4. WORK REQUEST NO. (For BCE Use)
5. NAME AND PHONE NO. OF REQUESTER			6. REQUIRED COMPLETION DATE		7. BUILDING, FACILITY OR STREET ADDRESS WHERE WORK IS TO BE ACCOMPLISHED
8. DESCRIPTION OF WORK TO BE ACCOMPLISHED <i>(Include Sketch or Plan, when appropriate)</i>					
9. BRIEF JUSTIFICATION FOR WORK TO BE ACCOMPLISHED <i>(Not required for maintenance and repair)</i>					
10. DONATED RESOURCES					
FUNDS		LABOR		MATERIAL	
				CONTRACT BY REQUESTER	
				NONE	
11. NAME OF REQUESTER			12. GRADE OF REQUESTER		13. SIGNATURE OF REQUESTER <i>(See Reverse of Form)</i>
14. COORDINATION					
SECTION II - FOR BASE CIVIL ENGINEER USE					
15. WORK ORDER <i>(Place an "X" in the appropriate box.)</i>					
IN-SERVICE		SELF-HELP		CONTRACT	
				SABER	
16. DIRECT SCHEDULED WORK <i>(Place an "X" in the appropriate box.)</i>					
EMERGENCY		URGENT		ROUTINE	
				SELF-HELP	
				M/C	
17. SELF-HELP <i>(Place an "X" in the appropriate box.)</i>					
BRIEFING REQUIRED			ADEQUATE COORDINATION		INSPECTION REQUIRED
SECTION III - COMPLETE ONLY IF WORK IS TO BE ACCOMPLISHED BY WORK ORDER					
18. WORK CLASS		19. PRIORITY		20. ESTIMATED HOURS	
				21. ESTIMATED FUNDED COST	
				22. ESTIMATED TOTAL COST	
23. THERE IS NO NEED FOR AN ENVIRONMENTAL ASSESSMENT (AFR 19-2)			24. A WRITTEN ASSESSMENT IS BEING/HAS BEEN PROCESSED		25. APPROVED
					26. DISAPPROVED
27. REMARKS					
SECTION IV - APPROVING AUTHORITY					
28. NAME AND GRADE <i>(Please Type or Print)</i>				29. SIGNATURE	
				30. DATE	

60 Air Mobility Wing Form 55
Excavation Permit

EXCAVATION PERMIT						1. TRACKING No.		
PART I								
2. Excavation clearance at the following _____								
Description of work to be done: _____								
on Work Order/Job _____, Contract _____								
The excavation area involved was properly staked and/or clearly marked in white _____ (DATE) to indicate where the proposed - on _____								
3. TYPE OF FACILITY/WORK INVOLVED								
A. Pavements	B. Drainage Systems	C. Fire Detection and Protective Systems	D. Utility <input type="checkbox"/> Overhead <input type="checkbox"/> Underground	E. Communications <input type="checkbox"/> Overhead <input type="checkbox"/> Underground				
F. Aircraft or Vehicular Traffic Flow	G. Security	H. Medical	I. OTHER (Specify) _____					
INSTRUCTIONS: This excavation permit is required for any interior or exterior excavation deeper than six inches. This form is used to coordinate the required work with key base activities so all base utilities in the area of excavation may be marked, and to identify potentially hazardous work conditions. It is also used to notify the proper agencies of possible road closures so as to keep customer inconvenience to a minimum. This excavation permit will be processed after the excavation area has been properly staked or marked in white (IAW Underground Service Alert (USA) guidelines). This Excavation Permit is valid only if it is signed by the Approving Officer. If excavation delays are encountered and/or conditions at the excavation site change (due to weather, heavy traffic, or construction) which cause the utility markings to no longer be visible then this excavation permit will no longer be considered valid.								
4. Organization/Company Name				5. Phone Number		6. Date		
7. Name of Requester				8. Signature				
9. Date Submitted	10. Date Clearance Required	11. Date Clearance Terminated	12. Depth	13. Areas to be Excavated <input type="checkbox"/> Main Base <input type="checkbox"/> MFH <input type="checkbox"/> Airfield <input type="checkbox"/> DGMC <input type="checkbox"/> Other (Please specify) _____				
PART II								
EXCAVATION CLEARANCE REVIEW								
ORGANIZATION		NO UTILITY IN AREA	UTILITY NEEDS TO BE MARKED	DATE UTILITY MARKED	PRINTED NAME	INITIALS	RENEWAL STOP REQUIRED	
							YES	NO
14. Base Civil Engineering	A. Water/Gas/Sewer Distribution							
	B. Electrical Distribution							
	C. Heat Distribution (Zone 3)							
	D. Drainage Systems							
	E. POL Distribution							
	F. Controls/Alarms							
	G. Engineering Technician							
	H. Fire Department (Only when traffic is affected)							
15. Environmental Management								
16. 60 CS Leased Comm/QS/GTE (Fiber/Metro Cable)								
17. Base Operations								
18. PAC Bell (Notified by USA)								
18. TCI/Cable TV								
20. Safety								
21. 60 Security Forces (Only when traffic is effected)								
22. 60 Medical Group Ambulance Service (Only when traffic is effected)								
23. Other (Specify)								

PART III

UNDERGROUND SERVICE ALERT (USA) NOTIFICATION

UNDERGROUND SERVICE ALERT (USA) HAS BEEN NOTIFIED BY THE DIGGER. (1-800-227-2600)

Note to digger: USA must be notified every fourteen (14) calendar days as long as excavation continues.)

24. Date USA Called

25. USA Expiration Date

26. USA#

27.

USA EXTENSIONS

New Extension Date	New USA Number	New Extension Date	New USA Number	New Extension Date	New USA Number

PART IV

28. REMARKS (This section must describe specific precautionary measures to be taken before and during work accomplishment. Specific comments concerning the approved method of excavation, hand or powered equipment to be included.)

Approval Recommendation: Maintenance Engineering

29. Date

30. Typed or Printed Name and Grade of Recommending Official

31. Signature

Approval Authorization

☐

Approved

☐

Disapproved

Date Approved

33. Date Expires (90 days from approval)

34. Signature of Approving Officer (Chief/Deputy Chief of 60 CES Operations)

Responsiveness Summary

First Public Comment Period

The Air Force used the *North/East/West Industrial Operable Unit, Travis Air Force Base, Proposed Plan for Soil, Sediment, and Surface Water* (Travis AFB, 1998a); the *West/Annexes/Basewide Operable Unit, Travis Air Force Base, Proposed Plan for Soil Cleanup* (Travis AFB, 1998c); and the 8 July to 8 August 1998 public comment period to promote public input on the basewide soil remediation approach. The public received these Proposed Plans just prior to the start of the public comment period. To encourage public comment, the Air Force listed the phone numbers and e-mail addresses of Air Force and California Environmental Protection Agency Department of Toxic Substances Control (Cal-EPA/DTSC) representatives in the Proposed Plans; mailed more than 1,300 copies of the Proposed Plans to interested community members; distributed copies of the Proposed Plans to local libraries; and held a public meeting on 23 July 1998 at the Fairfield Senior Center.

Several community members attended the public meeting, and the Air Force received oral comments from several people, including Mr. Jim Whalen, Mr. David Kanouff, and Mr. Jon Weiss; all of these individuals were members of the Travis Air Force Base (AFB or Base) Restoration Advisory Board at the time of the public comment period. Mr. Rick Abbott submitted a comment on the basewide soil remediation approach to the Air Force during the public comment period. A written transcript of the public meeting contains the oral comments and is available for public review at the Travis AFB Information Repository, located at the Vacaville Public Library. The oral comments concerning the cleanup of contaminated soil at Travis AFB are presented below in a paraphrased form for greater clarity. The Air Force based the selection of soil remedial actions in the North/East/West Industrial Operable Unit (NEWIOU) on the documents in the Travis AFB Administrative Record and on public comments.

Public Comment 1 from Mr. Jim Whalen: There was concern whether the Corrective Action Management Unit (CAMU) proposal had accounted for the synergistic effect of multiple chemicals in the soil within the CAMU.

Air Force Response: The NEWIOU Soil, Sediment, and Surface Water Record of Decision will present a detailed chemical analysis of the material proposed for placement in the CAMU. This analysis will show that the soil contaminants placed in the CAMU are compatible with the existing waste and with each other. This analysis is necessary in order to meet the criteria found in the federal and California CAMU regulations.

Air Force Response Update: After the first Proposed Plan public meeting was held in 1998, the Air Force published the *Corrective Action Management Unit Soil Acceptance Criteria Technical Memorandum* (Radian, 2001). This technical memorandum presents the chemical analyses that support the placement of material from all NEWIOU and WABOU soil restoration sites into the CAMU.

Public Comment 2 from Mr. David Kanouff: There was concern that the soil contaminants that do not readily decompose through natural attenuation, such as polychlorinated biphenyls (PCBs) and pesticides, will contaminate the local groundwater beneath the CAMU.

Air Force Response: There are three considerations that alleviate this concern. First, the design of the CAMU will specify that there will be a 5-foot separation between the contaminated soil from other soil sites and the water table. This will ensure that the consolidated soil sits above the water table and is not in physical contact with the groundwater. Second, the CAMU cap above the contaminated soil is a low-permeability barrier that significantly reduces the amount of rainwater that would flow through the soil and transport contaminants to the local groundwater. Finally, contaminants such as PCBs, pesticides, and metals are relatively immobile. Most of the mobile contaminants have either volatilized into the atmosphere or dissolved into the local groundwater. The remaining contaminants are suitable for placement into the CAMU, because they are relatively immobile. To support this conclusion, the leachability assessment demonstrated that the consolidated soil would not adversely impact groundwater. The low-permeability cap constructed above this soil will increase this immobility, because there will be much less rainwater infiltration through the contaminated soil than that which occurs today.

Public Comment 3 from Mr. Jon Weiss: Has Travis AFB established target levels for the contaminated materials proposed for the CAMU that are acceptable to the regulatory agencies and to the Air Force?

Air Force Response: The regulatory agencies received and reviewed the proposed contaminant target (or acceptance) levels based on computer modeling and other supporting rationale in a document known as the *Corrective Action Management Unit Soil Acceptance Criteria* Technical Memorandum (Radian, 2001). The Air Force and regulatory agencies will finalize these levels in the NEWIOU Soil, Sediment, and Surface Water ROD. One source of supporting rationale is the leachability assessment, which demonstrated that the target levels for the consolidated soil do not pose a potentially adverse impact to groundwater.

Air Force Response Update: After the first Proposed Plan public meeting was held in 1998, the Air Force and the regulatory agencies finalized the CAMU soil acceptance levels in Table II-5-9 of the WABOU Soil ROD (Travis AFB, 2002a).

U.S. EPA Response: The State is the lead regulatory agency for landfill closures and for the CAMU. The CAMU proposal for Travis AFB will be going through a review process to demonstrate that the synergistic effects and persistence of chemicals will not create an environmental problem. Modeling and calculations that support this proposal will be presented to the public.

Public Comment 4 from Mr. Rick Abbott: Has Travis AFB considered the use of Supercritical Oxidation Steam, a treatment technology used by the Texas Heavy Oil Recovery Company, to break down the soil contaminants?

Air Force Response: The WABOU Feasibility Study (FS) (CH2M HILL, 1998a) evaluated a large number of potential soil treatment technologies for use at the WABOU soil sites. The FS considered a technology known as Steam Stripping/Metal Extraction to be an effective method of removing organic compounds and heavy metals from soil. However, this technology was

rejected due to its extensive equipment, labor, and energy requirements and the associated high capital and maintenance costs. If this technology can be shown to remediate contaminated soil in a cost-effective manner, then the Air Force will consider it for future soil remediation projects. The Air Force Center for Environmental Excellence (AFCEE) supports the evaluations of innovative technologies and provides opportunities for small businesses to assist in remediation projects. Travis AFB gave Mr. Abbott information to assist him in contacting AFCEE.

Second Public Comment Period

In January 2006, Travis AFB printed a fact sheet that described significant changes to the soil remedial actions at 12 of the 18 NEWIOU sites. The 12 sites are Fire Training Area 1 (FT002); Sludge Disposal Site (OT010); Solvent Spill Area, Facilities 550/552, and 1832 (SS015); Oil Spill Area, Facilities 11, 13/14, 20, 42/1941, 139/144, and sections of Storm Sewer Right-of-Way (SS016); Oxidation Pond Site (WP017); MW-329 Area (SS029); MW-269 Area (SS030); MW-107, and MW-246 (ST032); Facility 811 (SD034); Facilities 818 and 819 (SS035); Facilities 872, 873, and 876 (SD036); Sanitary Sewer System, Facilities 837, 838, 919, 977, and 981, Area G Ramp, and Ragsdale/V Area (SD037).

After mailing the fact sheet to approximately 1,300 local community members and providing copies to the three local libraries, the Base initiated a 16 January – 15 February 2006 public comment period to obtain public input to the remedial action decision making process. Additionally, the Base posted the 1998 *North/East/West Industrial Operable Units, Travis Air Force Base, Proposed Plan for Soil, Sediment, and Surface Water* and the 2006 fact sheet on its Environmental Restoration Web site (<http://public.travis.af.mil/pages/enviro>).

To further promote community acceptance of the remedial action changes, the environmental office held a public meeting on 26 January 2006 at 7:00 p.m. at the Northern Solano County Association of Realtors Office, 3690 Hilborn Road, Fairfield, CA. The meeting was announced in the fact sheet, and a public notice was placed in three local newspapers to inform the public of the meeting. At this meeting, the Base described the Air Force's proposed changes to its soil cleanup strategies at 12 of the 18 NEWIOU sites and the decision process used to develop them. This information was also in a supplemental handout provided at the meeting. Mr. John Foster was the only community member who attended the public meeting. At the end of the Base presentation, he asked for clarification that the process for evaluating and changing the action at each site is documented in the three technical memoranda (Human Health Tech Memo, Eco Tech Memo, and Groundwater Protection Tech Memo). Travis AFB representatives confirmed that that was correct. There were no other questions.

The Air Force and the regulatory agencies did not receive any public comments on the changes to the soil remedial actions.



Travis AFB

